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Constructing the Long Term: The Positive Case in Climate Policy and other Long Crises

by

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¹ Prepared for the panel, "Long-Term Policy Challenges: Conceptual, Empirical and Methodological Approaches II," at the annual meeting of the International Studies Association, Chicago, February 28 – March 3, 2007.

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Introduction

The long term is a defining characteristic of sustainability. Other goals may have an implicit long-term element, but they are not defining. Scholars and lay alike consider constitutional democracy an ideal form of government, one to be fought for, negotiated, and enshrined in institutions of law and administration. As such, it is not a transitional form of government, not one to be disposed of once the ideal has been reached, as was the case with communism or many military dictatorships. Economists and business leaders consider economic growth as a goal that aims to generate wealth now and for the future because today's wealth is the basis for accruing future wealth. Leaders seek peace for the present and foreseeable future, not as a temporary measure, not as an interregnum between hostilities, but as a permanent state of affairs.

In all these goals—democracy, growth, peace—the long term element is thin; it merely follows from the very desirability of the goal itself: since peace is a good thing, obviously we want it all the time. In sustainability, the long term element must be thick, it must stand out, bold and explicit, constantly debated and negotiated to be sure, but prominent and defining.² In part this is because the sustainability goal has arisen at a historical juncture (roughly the 1980s to the present) where so much decision making is short term. A primary reason is the ever-increasing penetration of the market where more and more of life, especially everyday life, is commodified and where the externalization of costs, the distancing of commerce, all informed by modern economics, a form of reasoning inherently short term, even atemporal prevails. Another reason is the degeneration of electoral politics, especially in the U.S., where money and the imperatives of fundraising speak louder than the needs of the elderly, children, the uninsured, the mentally ill, the disaster prone.

But the larger reason for developing a thick notion of the long term is the state of the environment, both the biophysical environment, that is, the material underpinnings of all economies, and the social environment, the relations among people and between people and the natural world. The strain on these dimensions are well documented, and the trends are rarely positive. Yet for many, that is, those who can buy their way out of the consequences of environmental degradation (for now), things look good. For them, roughly a fifth of the world's population, concentrated in the North and in capital cities of the South, the challenges of life are indeed short term; the future, as always, will take care of itself. The trends speak otherwise, however, for rich and poor alike: no one escapes climate change or persistent toxics or the consequences of depleted soils.³

The challenge of so constructing a “thick” long term rests on a central dilemma in the global environmental problematic: the incidence and scope of cause-effect time lags and consequent proliferation of risks is expanding at the same time that time scales of practice are contracting (from the years and seasons of agrarians to the minutes and nanoseconds of

² My call for the long term as a defining element of sustainability should not be confused with a claim that there is, or should be, a single definition of sustainability. As Jack Manno points out (personal communication, February 2007), the goal of sustainability, like other major societal goals such as democracy, or I would add, peace, are best “defined” by what they are not. So, as I have elaborated elsewhere, sustainability is not mining or environmental improvement. See Thomas Princen, *The Logic of Sufficiency* (Cambridge, Mass: MIT Press, 2005), pp. 29-32.

³ In fact, the consequences of environmental degradation are felt in the near term by the poor while, for the rich, they are largely felt in the far term. Manno, personal communication, February, 2007.

technologists, for instance). Overlaying this twin phenomenon is a pervasive belief that humans are inherently short term, a belief buttressed by:

- i. everyday experience (e.g., shopping as recreation and expression; throw-away product design, packaging, and buildings for ; investing as gambling;
- ii. science (especially behavioral biology: it's all a fight for day-to-day survival and reproduction);
- iii. markets (especially those dominated by discounted financial mechanisms); and
- iv. politics (especially that driven by public opinion polls and marketing reports).

In this paper I argue that it is not enough to make pleas for long-term thinking. Scientific evidence for time-lagged risk proliferation has no more bearing on policymaking or everyday life (e.g., consumption) than historical evidence has on the imperialistic ambitions of political leaders (with the urge to dominate and the likelihood of overextension). A more fruitful approach is, on the one hand, to expose the seemingly natural or inevitable short-termness of contemporary thought and practice and, on the other, to identify structural conditions that lean decisionmaking away from the short term and toward the long term.

This paper, then, is an attempt to construct a long term, not through scientific proof or appeals to environmental necessity, but through a logic of thought and action grounded in history, ecology, organization and politics. I start with a brief characterization of the biophysical and social context for which the imperative of long-term thinking is most evident—"long crises"—then turn to what is perhaps the most vexing issue in the consideration of the long term, namely, the modern belief that humans are inherently short term. Here I trace several intellectual traditions that contribute to that belief. I then construct an alternative view, one grounded in research on human thinking and adapting and provide contrary evidence, some anecdotal, some historical, in modern business practice (cases) and theory (discount rate). I conclude by positing minimal conditions for a policy environment oriented to the long term, what I term a neo-prudential order.

Long Crises

Human vulnerability is increasing with a growing global population, increasing inequality, migration, short-term settlement, climate change, and environmental deterioration. Proliferating risks throw into question the ability of conventional policymaking in an industrial society to steer a different course. What is more, unlike early industrial risks, says sociologist Ulrich Beck, those of a risk society, the "nuclear, chemical, ecological and genetic engineering risks (a) can be limited in terms of neither time nor place, (b) are not accountable according to the established rules of causality, blame and liability, and (c) cannot be compensated or insured against."⁴ Such institutionally novel risks are "exemplified by a single example," says Beck: "the injured of Chernobyl are, today, years after the catastrophe, not even all born yet."⁵ Perhaps the best evidence for increasing vulnerability and proliferating risks is the expanding scope of uninsurable risks as determined by the private insurance industry, especially reinsurance.⁶

⁴ Ulrich Beck, "Risk Society and the Provident State," pp. 27-43, in Scott Lash, Bronislaw Szerszynski and Brian Wynne, eds., *Risk, Environment and Modernity: Towards a New Ecology* (London: Sage Publications, 1996); quote on p. 31.

⁵ Beck, 1996, p. 31.

⁶ Beck, 1996. Political theorist Hugh Dyer notes that insurance and reinsurance is reliable in part because of commercial selection: if they're wrong, they're out of business. At the same time, Dyer notes, they have little incentive to reduce risks. Personal communication, February 19, 2007.

But it may well be that it is precisely in the realms of the uninsurable that insurance companies do push for risk-reduction measures. Insurance companies were apparently the instigators of public fire departments, at least in the U.S., now, arguably, rezoning in disaster-prone areas.

Conventional response to such risks is just that, response; and it is governed by humanitarian impulse and charity. It is reactive, not anticipatory, not preventative, not proactive. It is, above all, short term. UN officials, diplomats, some military personnel, and, possibly most telling, lots of NGOs, are key actors. Raise the money, clean up, build a clinic, then clear out.

With increasing vulnerability to institutionally novel risks, reactive policies will be inadequate. The costs of relief will far exceed the costs of prevention; and the costs may well become cumulative. Irreversibilities, some biophysical (sea level rise, erosion, aquifer subsidence, desertification, extinctions, chemical transformation), some cultural (loss of livelihood; change in age structure; disappearance of indigenous knowledge) will render measures like clean-up and compensation meaningless.

In a world of increasing vulnerability, then, an alternative to reactive short-term policies is in order. And for that a normative structure, one grounded in biophysical and cultural features distinctive to long crises, is needed. One analytic challenge is characterizing the nature of these crises. Another is finding appropriate realms of human organization from which to derive norms and principles. A third is constructing a useful notion of the long term. Conventional policymaking, whether the zero-sum tug-and-pull of interstate competition or the trade and investment of global economic growth, are unlikely realms, much less high security, military strategy, or even relief and economic development.

Crises are about surprise and denial, about vulnerability and loss. And they are about ripple effects through cultures and economies and ecosystems with attendant, and unexpected, consequences. Conventional international politics are about control: states controlling other states (or resisting being controlled); states and business enterprises controlling resource flows; and everyone controlling nature (for resources or habitation or development). And they are about knowledge for ever-more effective control—more manipulation, more experimentation, more gain, more risk. Effective crisis policy is about anticipation and prevention, about planning and restraint; about knowledge that minimizes vulnerability, about thinking and acting for the long term.

A crucial element in policymaking for a future of long crises is long-term decisionmaking. Contemporary assumptions about humans' inherent short-termness and the disparagement of those who attempt to infuse a longer time frame (what has the future ever done for me?) must be examined for their scientific, historical and rhetorical claims. Conditions for long time horizons can then be identified.

Humans: Short termers, naturally

A central conundrum in the need to infuse a long-term perspective into climate policy and other environmental decision-making is the widespread belief that humans are inherently short-term thinkers. Conventional wisdom has it that, left to their own devices, humans will satisfy their urges today; the future is another day, another lifetime. It's just human nature. At the same time, environmental wisdom has it that long-term thinking is necessary to protect the environment and, because some humans—indigenous peoples, the Amish, scientists, enlightened forest managers and, of course, environmentalists—have always acted in the long term, certainly the rest of us, including us denizens of high-consuming Northern advanced industrial societies, can think long term too. Sustainability advocates (this author included) go a step further arguing that to accept anything less than the long term, indeed the very long term—socially, ecologically, even geologically long term—is an admission of failure, of condoning mining in the guise of environmental improvement.⁷ The fact that some people can act in the long term suggests a political breakdown, if not a moral one. But little reason is given for the apparent enlightenment: some have it, some don't. Everyone, though, seems to agree that strong measures must be taken

⁷ For distinctions among mining, environmental improvement, and sustainability, see Princen, *Logic of Sufficiency*, 2005, pp. 29-32.

to discourage humans' otherwise inherent short-term thinking and encourage the long term, however rare and unnatural it may be. Somehow those who would design such measures will defy conventional wisdom: that is, they themselves will not be short-term thinkers.

A more fruitful approach is to simply assume, based on observation and current knowledge, some scientific, some literary, some political (see below), that humans are capable of both short-term and long-term thinking, and then ask what are the conditions in which they lean one way or the other. The assumption that humans have capacities for both short-term and long-term thinking is analogous to other dualities in behavior, each of which has substantial empirical evidence: self-interest and altruism; competition and cooperation; aggression and nurturance; indulgence and restraint. What is more, this assumption eliminates the randomness as well as the debate about whether and to what degree humans are short term or long term in their time orientation. Perhaps most importantly, this approach directs attention to conditions and structures—expectations and norms, habits and customs, rules and procedures, laws and regulations—that is, to things that can be deliberately changed, unlike “human nature.” First, though, I lay out four areas of practice and knowledge that contribute to the prevailing short term belief, and show their fundamental weaknesses.

The everyday. Everyday experience in a modern industrial economy, an economy that is highly commercial and expansionist and driven by principles such as time saving, convenience, speed, and growth supports the belief that humans are inherently short term. On the production side, members of such societies witness cost-saving measures such as mechanization, outsourcing, synthetics, and throw-away packaging. The construction industry, for instance, is driven by the quest for short-cuts, for building faster and cheaper. Occupants end up with shoddy workmanship, fixtures that corrode within months, and roofing that lasts only ten years.

On the consumption side, people shop as recreation or personal expression. They buy cars and houses to signal status and readily sell them to signal status shifts. To be a successful modern is to be on the move, to be fashionable, to cast off ties to the past just as fast as one can. It is to accumulate wealth to be sure, but rarely to spend it on durable items. In fact, many consumer items are made to throw away when a component wears out or something goes wrong (e.g., disposable cameras, computers, cars).

The biological. From the biological perspective, humans are short-term thinkers (indeed, maximizers) because they have two primary drives—to survive and to reproduce. All other behaviors ultimately can be reduced to these drives, or can be dismissed as trivial or anomalous. Survival is immediate and day-to-day, feeding when hungry, preparing shelter when night falls. Reproduction is similarly immediate and day-to-day: when the urge comes, one copulates, or begins the rituals leading to copulation.

From this perspective, all attempts at long-term behavior fight an uphill battle. Humans can imagine longer time frames and they can reason why humans should act accordingly. But they cannot completely override their innate tendencies to satiate and satisfy today, leaving tomorrow as yet another day.

It is probably true that few people, even in a modern, well-educated society, can work through the evolutionary argument. But the reasoning has arguably permeated society from the time of Darwin. Much as people assume humans are inherently (“naturally”, “biologically”) self-interested or competitive or aggressive or indulgent, they assume it is “in our genes” to act short term. Certainly other animals are this way; we must be, too. The biological assumption of short-termness comes up short in part because the reasoning ignores culture, and the biological basis for culture. That we understand, appreciate, strive for, and enact long-term goals—intergenerational sustenance, governance over many years and decades, sacrifice for future crop yields, legacy projects—seems to be evidence enough that humans have

evolved to be social, cultural beings. We think beyond ourselves and we think beyond the present. And we organize among ourselves to enact our desires for the “other” and the “future.”⁸

Economistic and psychological. Psychology, as far as I can tell, has no focus on the temporal, short of what I present below. In fact, it appears biased to the immediate and short term. In the study of emotion, for example, emotions are defined as that designed “for promoting quick and specific life-preserving actions in life-threatening situations.” Thus, anger “creates the urge to attack, fear the urge to escape, disgust the urge to expel, guilt the urge to make amends”⁹ As we’ll see, other emotions, the “positive emotions,” have been little studied yet appear associated with the higher cognitive processes, most of which have a long-term orientation (e.g., planning, organizing).

The next section surveys contrary evidence to this belief in the short term. It draws on the biological and cultural side, while the following section draws on the organizational side to illustrate the possibility of long-term decisionmaking.

Constructing the Long Term

The Adapting Mind: Biological, Psychological, and Cultural Evidence

A first-cut evolutionary analysis of human decisionmaking does indeed point to the short term. Humans, like other creatures, are driven to procure food and to reproduce. These are immediate needs, met day-to-day: when I’m hungry I forage and hunt; when I’m aroused I look for a mate. A second cut analysis, one informed by adaptations—biological and cultural—in the hunter-gatherer stage (the first two million years or so of human history) and after (the last 15,000 or so years) suggests that humans acquired a long-term thinking capacity. Developments in human biology, child psychology, behavioral ecology, neurology and anthropology, all informed by evolutionary arguments, are instructive.¹⁰

Biorhythms Time is a fundamental aspect of life. Living things, from cells to organisms to communities, have a “biological clock” where their internal and external functions follow the rhythms of the solar day, the lunar month, the seasons, tidal flows, and annual cycles. In both plants and animals this “clock” often continues to tick even when the apparent stimulant—day length, temperature, water level—is removed; in short, it’s endogenous, not located in any single organ or tissue (e.g., the brain), but characteristic of the whole organism. In humans, evidence for cycles in metabolic rates, hormonal secretions, body temperature, heartbeat, blood pressure, urine flow, menstruation, and waking and sleeping are well established.¹¹ Psychologist John E. Orme puts the adaptive significance thus:

The physical universe is basically rhythmic in nature. The moon revolves around the earth, the earth around the sun, and the solar system itself changes spatial position with time. All these phenomena result in regular rhythmic changes, and the survival of biological species depends on the capacity to follow these rhythms.¹²

⁸ By “other” here I mean those beyond the individual yet within the tribe, race, religion, or nation.

⁹ Barbara L. Fredrickson, “What Good Are Positive Emotions?” *Review of General Psychology* 1998, Vol. 2, No. 3, 300-319; quotes on p. 302.

¹⁰ For readers not enamored with biological, evolutionary arguments, I suggest jumping to the next section, “The Organizational,” pausing perhaps to note the psychological evidence for future-oriented behavior.

¹¹ Jeremy Rifkin, 1987, *Time Wars: The Primary Conflict in Human History* (New York: Henry Holt and Company).

¹² John Orme, “Time: Psychological Aspects—Time, Rhythms, and Behavior,” in Tommy Carlstein, Don Parkes, and Nigel Thrift, eds., 1978, *Making Sense of Time* (New York: John Wiley & Sons), p. 67; quoted in Rifkin, 1987, *Time Wars*, p. 36.

So organisms are temporally adaptive in two senses: they have built-in temporality and they have the capacity to adjust their temporality as environmental conditions change. For humans, one such environment is society. We are socialized into particular patterns and conceptions of time, and these vary from one society to another. Forest dwellers follow the sun and moon; urbanites the clock and computer. But there is evidence that all humans go through a common temporal development: from birth to one-and-a-half or two years the child lives entirely in the present (but see below for recent evidence of “future-oriented processes” even in infants); between two and three years the child conceives of (and speaks about) a past, present, and future; at five or six the child understands days of the week; at six the child understands the meaning of the seasons, at seven the notions of months and clock time; and between eight and thirteen the child’s temporal perspective lengthens, both into the past and the future.¹³ As we’ll see, that perspective appears to continue lengthening right into old age.

Child development and future-oriented processes One would expect to find some kind of future-oriented behavior such as intentionality, goal setting, prediction, expectation, anticipation, and planning in humans, says psychologist Marshall Haith, “because the information they collect takes place in time and a natural consequence of this ‘ambient’ processing is the automatic formation of expectations about what comes next as well as about what the future portends.”¹⁴ Indeed, infants as young as three months are sensitive to the timing of events and can form expectations about those events. “This type of temporal mapping may form the basis for the temporal expectations and planning they will employ later when more advanced motor skills permit them to mesh their own activity with the events they can only observe at this early age.” In addition, the temporal mapping appears to occur simultaneously with spatial mapping, such that “babies form expectations for what they will see as well as when and where they will see it.” This temporal/spatial simultaneity, we’ll soon see, dovetails with the cognitive processes of way finding, what our hunter-gatherer ancestors engaged in for some two million years. On top of the temporal/spatial cognitive mapping, Haith and his colleagues have “demonstrated that babies can carry forward expectations over at least several days, and they appear to be able to remember a rule that constitutes the basis for forming expectations.”¹⁵

All told, this research demonstrates that humans, at their earliest stages of consciousness, are far from simple stimulus-response machines. They have a “basic ability to extract predictability from a dynamic series [of events]”, says Haith, “and no doubt [this ability] is applied to more sophisticated episodes as the child matures.”¹⁶ Their temporal (and spatial) cognitive capacity enables expectation and prediction and, later in life, anticipation and planning. “Future-oriented processes are basic and pervasive human biopsychosocial capacities,” adds Robert Emde. “They do not suddenly appear as a class of behaviors at a certain time in either ontogeny . . . or development . . . nor do they usually require task-specific features for their activation Variations in future-oriented processes appear to be more in their ‘use.’”¹⁷ Among those uses is way finding and setting fire.

Way finding When humans spread out across the savannahs they had to travel long distances to hunt and forage. All the good niches were filled so humans, with their increasingly upright gait

¹³ Melvin Wallace and Albert L. Rabin, “Temporal Experience,” *Psychological Bulletin* 57 (1960), pp. 213-236; in Rifkin, 1987, *Time Wars*, p. 46.

¹⁴ Marshall M. Haith, “Visual Expectation as the First Step toward the Development of Future-Oriented Processes,” pp. 11-38, in Marshall M. Haith, Janette B. Benson, Ralph J. Roberts Jr., and Bruce F. Pennington, eds., 1994, *The Development of Future-Oriented Processes* (Chicago: University of Chicago Press); quote on p. 13.

¹⁵ Haith, “Visual Expectation as the First Step toward the Development of Future-Oriented Processes,” 1994; quotes on pp. 21, 28 and 31.

¹⁶ Haith, “Visual Expectation as the First Step toward the Development of Future-Oriented Processes,” 1994; quote on p. 35.

¹⁷ Robert N. Emde, “Further Directions: Variations in the Use of Future-Oriented Processes,” pp. 437-441, in Marshall M. Haith, Janette B. Benson, Ralph J. Roberts Jr., and Bruce F. Pennington, eds., 1994, *The Development of Future-Oriented Processes* (Chicago: University of Chicago Press).

and large brains, carved out a different niche, one at once spatial and temporal, based not just on social organization and use of tools, but on way finding. Being home-based creatures, like other primates, but unlike lions and whales, for instance, they always came home. To do so, they had to create mental maps of where they were in relation to home. “The ancestral environment of hunter-gatherers was no doubt characterized by moment-to-moment fluctuations in safety and satiation, especially as these early hunter-gatherers made their way across land,” writes psychologist Barbara L. Fredrickson. “Abilities to recognize and take advantage of the opportunities inherent in safe and satiated moments would have thus been important.” Among those abilities was planning: The more familiar and accomplished they became in their territory, the more they were able to plan the hunting and foraging trips in advance. Precious energy and lives could be saved thinking through the route and the time it would take to get from one place to another. Such planning allowed them to anticipate opportunities based on past experience yet not as a simple extrapolation of past experience. In short, they could learn from the past so as to explore in the future. The mental maps, the cognitive capacity to image those places and imagine the time required to get to them, were thus both geographic (where is the stream in relation to the forest) and temporal (how many days and nights will it take to go to both the stream and the forest).¹⁸

Increasing ability to mentally map one’s physical environment (as well as to negotiate one’s social environment, what I do not take up here) conferred competitive advantages on these home-based hunter-gatherers enabling populations to grow and spread. Underlying these advantages was the cognitive capacity to plan, to create images of movement through places in time. Significantly, and consistent with the child development findings, the neurology of that imaging appears to be the same for the spatial and the temporal. The neocortex is the primary site of the so-called executive functions—creating, organizing, planning. Humans simultaneously developed the capacity to negotiate complex physical and temporal environments. And a complex temporal environment is one that includes multiple time scales, from the immediate to the near term to the far term. It turns out that, neurologically, the immediate appears to be entirely distinct from the near and far term, what I’ll term “the future”; the two—immediate and future—occur in completely separate portions of the brain. The immediate is associated with the autonomic nervous system and the brain stem while the future is associated with the neofrontal cortex. The same neurons fire when imagining a distant place as when imagining the travel and, hence, the time to get to the place. Neurologically, there is no difference between imaging complicated places and distant futures. For present purposes (constructing a counterweight to modernity’s pervasive belief in the short term) this is significant because it suggests that humans have a considerable capacity to imagine and plan for the future, and not just for the near-term future, but for the far-term future, too.

But as advantageous as this dual temporal capacity was to our hunter-gatherer ancestors, it has become increasingly problematic for us moderns. That is, for all the benefits of future-oriented thinking, humans still have had to deal with the here and now, the crumbling ledge, the coiled rattlesnake, the aggressive neighbor, the tree ripe with fruit, the prey that suddenly appears. What is more, in such situations, the immediate must override the future: one cannot be “lost in thought,” planning, say, tomorrow’s hunt, while a lion stalks nearby. The flexibility of the long-term capacity and the dominance of the immediate, I will soon argue, creates political space for manipulation in large-scale societies.

Fire A second use of biorhythms and future-oriented processes is fire. Early humans may have initially used fire to clear land and drive prey.¹⁹ But the advantages of re-growth and improved

¹⁸ J.H. Barkow, Leda Cosmides and John Tooby, eds., 1992, The Adapted Mind: Evolutionary Psychology and the Generation of Culture, New York: Oxford University Press; David J. Buller, 2005, Adapting Minds: Evolutionary Psychology and the Persistent Quest for Human Nature (Cambridge, Mass: MIT Press). I thank psychologist Raymond De Young for introducing me to this argument and guiding me through the literature.

¹⁹ Pyne, Steven, 2004, Tending Fire: Coping with America’s Wildland Fires Washington: Island Press/Shearwater Books.

habitat for prey must have soon become apparent. These benefits accrued well after the act of setting the fire, after the investment of time and effort, and after the risks were incurred. To return to a burned site and defend its enhanced resources required foresight, imaging, and planning, thus extending hunter-gatherers' time frame by months and seasons, even years. Whether there was selective pressure and genetic adaptation or just a cultural adaptation based on pre-existing cognitive capacities (e.g., from way finding) is not as significant as the fact that, at some point in humans' biological and cultural evolution, their decisionmaking shifted from the immediate (eat when hungry, copulate when aroused) to invest now (burn), reap the rewards later (next season when the berries have grown and the deer moved in). This pattern could well have been a precursor to shifting cultivation (with long fallows) and then settled agriculture where the time horizons are even longer.

One implication of these findings in biology and psychology is that it is easy to understand how the daily experience of moderns confirms a belief in the inherent short-termness of humans: much of what we do is indeed "getting through the day," reacting to demands and challenges as they arise, immediately. It is also easy to imagine social structures emerging that exploits this dual capacity for the future and immediate. Rulers from time immemorial have convinced their subjects that, as miserable as their lives are now, the far future, the next life, the afterlife, will be better, indeed, heavenly. The cognitive flexibility of the future creates a susceptibility to imagined futures that privileges one segment of society over another. Today's rulers, the CEOs and bankers and marketers, convince citizens, parents, community volunteers and voters that they are consumers, buying product for today's gratification; tomorrow's gratification can be bought tomorrow. The purveyors of the immediate are implicitly playing on humans' innate orientation to the immediate. But just because the rulers of the past and present have been so successful confirms neither that humans are inherently long term or inherently short term (what I'm calling "the future"). What is more, the neurological capacity for the immediate should not be confused with short term thinking which is physiologically distinct and of a sort with long term thinking. The fact that humans are biologically oriented to the immediate and that the immediate overrides the future (e.g., under threat or opportunity) does not mean we are incapable of or even disinclined to deal with the future. Quite the contrary; the evidence suggests humans are "hard wired" to think about and plan for the future, the near future (days and weeks, say) and the far future (years, decades and generations, say). Carrying roughly the same ancestral wiring, humans in a modern environment are just susceptible to manipulation via both the far future and the immediate.

In sum, in the hunter-gatherer stage, the human brain enlarged to handle a complex physical (and social) environment. The capacity to image and plan (neurologically the same, it appears) extended humans' time horizon from the immediate to the near and far term. They acquired a neurologically defined dual temporal capacity. Although at a given moment—when the ripe fruit is discovered and others are about to harvest it; when the lion is stalking—the immediate overrides the future, neither constitutes the "real" human time horizon. If there is a real human time horizon, it is both the immediate and the future (near and far term). And yet this very temporal duality makes people susceptible to manipulation.

To put it differently, there is no biological or psychological evidence to suggest that humans are unable to deal with the future, including the far future. There is plenty of evidence, however, that humans' dual temporal capacities (immediate and future) can be manipulated. Among other things, it is easy to convince people that their innate orientation to the immediate indicates a higher value for the immediate. That humans across cultures and time have routinely invested in the future—from parenting to grandparenting, from wayfinding to burning and planting and fallowing—suggests otherwise. Or, at least, it suggests that intertemporal value comparisons are as ill-informed as interpersonal utility comparisons, what economic theorists are quick to point out whenever utility theory is questioned. An especially pernicious instance is the

notion of net present value, and its core concept, discount rate. But before elaborating their history, I fill out the picture of human short-term and long-term thinking with behavioral phenomena that appear to build, both biologically and culturally, on this dual temporal capacity. One behavioral expression is what anthropologists hypothesize as a “grandmother effect,” another is what psychologists call “generativity,” and a third is “positive emotions.”

Grandmother effect Anthropologist Kristen Hawkes and her colleagues hypothesize a “grandmother effect” to explain the biologically anomalous fact that, unlike females of all other species, a third of women’s lives are lived after reproduction. They have found that by caring and providing resources to one’s daughters and the daughter’s children, grandmothers can promote their reproductive success better than if they were to continue to reproduce themselves.²⁰ This hypothesis suggests selection for long lives (longer than what can be explained by efficient resource appropriation for survival and reproduction) and for investing not just in children (what is well established) but in the elderly as well. The relevant time horizon is thus intergenerational, at a minimum, two generations—i.e., the benefits accrue to children (the grandmother’s children) and grandchildren.

Arguably, the grandmother effect builds in a time horizon crossing at least five generations. A given individual, as a child, is raised by, entrusted to, and trusting of one’s grandparents, thus projecting two generations ahead and employing, say, its future-oriented processes acquired in the ancestral hunter-gatherer stage via wayfinding. When that same individual becomes a grandparent, that person takes care of grandchildren, thus projecting two generations back. So each of us experiences five generations—two forward, two back, and one’s own. Given that, until modern times, people lived mostly in extended families, that a typical lifespan for those who survived childhood was 80 some years, and that a generation was less than 20 years, it is reasonable to conclude that our ancestors actually experienced roughly five generations on a daily basis, throughout life. And it is likely that those who could so perceive and take advantage of this five-generational time horizon enhanced their survival and reproduction. In short, an multi-generational time horizon was adaptive.

To speculate even further, if each of us has the cognitive capacity to encompass five generations in our thinking, that capacity is unlikely to discriminate between, say, four and five generations, or five and six or six and seven. In other words, an upper bound would serve no benefit. Six, seven or more generations would be perfectly “natural.” The fact that some cultures have seven-generation traditions lends support. “We are looking ahead, as is one of the mandates given to us as chiefs,” says Iroquois chief Oren Lyons,

to make sure [that] every decision we make relates to the welfare and well-being of the seventh generation to come, and that is the basis by which we make decisions in council. We consider: Will this be to the benefit of the seventh generation? This is a guideline.²¹

Generativity Psychologists have also found that humans’ future-oriented processes extend with age. Generativity is the tendency we all have to think more and more about the future as we age, especially from middle age (possibly earlier) on. And that future is not just our own, our old age and death, but a future after death and the concern for how we’ll be remembered; legacy becomes increasingly prominent. This pattern, what appears to be ubiquitous among adults across cultures, has been extensively studied since noted psychologist Erik Erikson first posited the idea in the 1950s. Much of the literature addresses issues of adult development, identity formation and well-being, including the meaning derived from work and intimate relationships, especially parenting,

²⁰ This description of the grandmother effect comes from accounts given in Low, Bobbi S., 2000, Why Sex Matters: A Darwinian Look at Human Behavior (Princeton: Princeton University Press, p. 112; and David J. Buller, 2005, Adapting Minds: Evolutionary Psychology and the Persistent Quest for Human Nature (Cambridge, Mass: MIT Press), pp. 221-223.

²¹ Oren Lyons, “An Iroquois Perspective,” in Christopher Yecsey and Robert W. Venables, eds., American Indian Environments: Ecological Issues in Native American History (New York: Syracuse University Press, 1980); cited in Rifkin, 1987, Time Wars.

gender differences, and the role of creativity and productivity. Nevertheless, generativity, wrote Erikson in 1950, is “primarily the concern in establishing and guiding the next generation.” More broadly, writes psychologist Abigail Stewart, it involves “the human impulses to create and to preserve what has been created . . . and are attributed to the long period of mature adulthood.” In addition, says Stewart, “the midlife experience of generativity may be usefully differentiated as including both an increased sense of efficacy [in creativity and productivity] and a vision of oneself as having made contributions to a wider community. The former facilitates a sense of well-being in midlife, but the latter may both support the hardworking middle-aged person’s efforts to take responsibility in a new sense and pave the way for later life wisdom and acceptance of ‘one’s one and only life cycle.’”²² Generativity, in short, is about the future, one’s own, one’s children’s, and the wider community’s. It appears to be the logical extension of a developmental pattern beginning with an infant’s future-oriented processes.

Positive emotion As a field, psychology, like economics and finance, has long had a short-term bias. With an emphasis on pathology, psychology has focused on people’s experienced problems, on stimulus-response, on negative emotions, on the pleasures and pains of the here and now. Many of these psychological phenomena have had adaptive value: a coiled snake elicits fear which increases the heart rate and enables quick flight. Research on cognitive development (especially child development), executive functions (e.g., creativity, problem solving and planning) and, most recently, positive emotions can be interpreted as a shift toward understanding humans’ ability to think and act with a long time frame. Even behaviors that seem immediate have, from the perspectives of evolutionary adaptation and psychological well-being, a long temporal orientation. The positive emotion of love is illustrative. “In the moment, exploring, savoring, and being playful with loved ones seems to have no obvious aim other than intrinsic enjoyment,” writes psychologist Barbara Fredrickson,

Over time, however, the interactions inspired by love no doubt help to build and strengthen social bonds and attachment. These social bonds are not only satisfying in and of themselves, but are also likely to be the locus of subsequent social support. In this sense, love and the various positive emotions experienced in love relationships (i.e., interest, joy, and contentment) build and solidify an individual’s social resources. Like intellectual and physical resources, social resources can accumulate and be drawn on later.²³

So positive emotions appear to build an individual’s resources, physical, intellectual, and social. Whereas negative emotions “serve to narrow people’s attention focus,” the positive ones serve to lengthen that focus: “though short lived, [they] facilitate learning and mastery, the products of which can become part of the individual’s enduring intellectual resources.”²⁴

In sum, says Fredrickson, the resources acquired through positive emotions “are durable and can be drawn on in later moments. As such, the adaptive value of positive emotions for human ancestors was not necessarily direct and immediate as was the adaptive value of negative emotions. Rather, human ancestors would have benefited from resource building in the long run.” So while the adaptive value of negative emotions is straightforward (individuals who did not respond immediately to the crouching lion did not become our ancestors), so is that of positive emotions. “To the extent that the capacity to experience positive emotions is genetically encoded,

²² Abigail J. Stewart and Elizabeth A. Vandewater, “The Course of Generativity,” in Dan P. McAdams and Ed de St. Aubin, eds., 1998, Generativity and Adult Development: How and Why We Care for the Next Generation (Washington, DC: American Psychological Association), pp. 75-100; quotes pp. 77, 94.

²³ Fredrickson, “What Good Are Positive Emotions?”; quote on pp. 306-307.

²⁴ Fredrickson, “What Good Are Positive Emotions?”; quotes on pp. 307, 311

this capacity, through the process of natural selection, is likely to have become part of universal human nature.”²⁵

To summarize, a biological and cultural basis can be established for long time horizons, including horizons longer than seasons and a few years. In other words, to infer a long time horizon in the investing in children (and the elderly), the instituting of a seventh generation decision rule, the preserving of works of art, and the writing of a constitution is not wishful thinking, nor is it paying undue attention to anomalous behavior: This is normal behavior! The short-term behavior so prevalent today may, from an evolutionary and historical perspective, be the anomalous behavior. If, e.g., generativity characterizes up to three fourths of the human lifespan and if all societies “naturally” invest in their non-reproductive, low productivity, resource-drawing elderly, then a society organized to reward its most unrestrained segments (teens, predatory capitalists, indulgent consumers) is the anomaly. Commercialism, discounted capital investment, consumerism and the like represents a retarded developmental stage, individually and collectively.

Put differently, it may not be possible, given current understanding--biological, psychological, anthropological, and historical--to conclusively establish a biological, evolutionary basis for a human time horizon commensurate with long crises such as global warming. It is possible, however, to establish a biological basis for the cultural evolution of long time horizons. All that is needed is the assumption that the time extension implicit in such phenomena as childhood temporal development, wayfinding, burning, the grandmother effect, generativity, and positive emotion, let alone in planting a crop, fallowing the land, and investing one's hard-earned capital, is itself extendable, that such an extension is generalizable to a variety of decisionmaking contexts. If human problem solving and social organizing enabled the biologically based, yet culturally elastic time frame to extend beyond the merely biological (say, seasons) to years, decades, and generations, even to the indefinite future, then humans can do so for heretofore unprecedented problems, including long crises. They have the capacity.

And if this is true, it suggests that the long-term behavior we do see, even in modern times (e.g., soldiering, preserving art work, etc.), has a biological basis, which cultural factors build on. Thus, just as modern industry has taken the biologically established fact of labor specialization between the sexes a step further (to workplace specialization in the factory and to a division of labor around the world), cultural innovations may well take the grandmother effect, generativity and other phenomena further. Institutions can be built; they always have. And they can embody norms and principles attuned to the needs of the time, however novel they may seem; they always have. Precaution, polluter pays, subsidiarity, capping, zero waste and sufficiency—what I lump under the term “neoprudence”—are candidates. Their ascendancy, from the perspective laid out here, might seem inevitable. From the perspective of contemporary politics and economics, of course, they will seem, at best, anomalous, at worst, self-destructive (they'll hurt the economy). One reason is that such “novel” norms and principles would bump up against prevailing notions of time, especially time value and its dominant manifestation, business organization.

Organizing Business for the Long Term: Knowledge, Ownership, Locality

Businesses, conventional wisdom has it, exist to reward their owners. The long term is that defined by capital markets, business cycles, and political elections, spanning, at most, a half dozen years. If owners wish to support a good cause, one that has pay-offs far down the road (e.g., preserving works of art, finding a cure for cancer, endowing an academic chair, saving a

²⁵ Fredrickson, “What Good Are Positive Emotions?”; quote on p. 312, emphasis added.

forest), that is a personal choice, a choice made after they have made money from business. The money making itself, however, is inherently a short term enterprise. Returns on investment are for the here and now. What owners do with those returns is their business—their personal business, not the business of business.

Such is the conventional wisdom in modern business circles. Critics such as David Korten, Paul Hawken, and Ray Anderson will argue otherwise, that corporations have a public duty, too, but few businesspeople buy it, certainly not those who answer to Wall Street.²⁶

There are, though, companies that have an unambiguous public function along with their strictly fiduciary functions. Law firms uphold the law; banks maintain consumer and investor confidence; major media ensure the public's right to know; cemeteries preserve the dead (or at least their memories). In these businesses, there is an implicit long-term orientation: one doesn't support the rule of law or build investor confidence or preserve the "fourth estate" and one's ancestors just to get to the next quarterly earnings report.

And there are businesses that by their very products and operations are necessarily long-term. Utilities build hydroelectric and nuclear plants, chemical companies build cracking plants, railroads lay track and build locomotives, and airplane manufacturers build jets. These are capital-intensive processes and products whose pay-back period necessarily extends to a couple or more decades. To some extent the timber industry is similar, but by virtue of the natural capital—trees take a long time to grow—not so much the financial capital (mills being the exception). Even when harvest rotations are pushed below ten years (with fast-growing, intensively managed monocultures), the planning horizon can be as much as 20 or 30 years.²⁷ And some industries have the capacity for making long-term products but for a variety of reasons steer away. The cement industry can make cement to last hundreds, even thousands, of years; indeed, the ancient Romans and possibly the Egyptians did just that. But now cement is made to set up quickly, rendering it a less durable material.²⁸

And there are still other businesses that, by the personal and organizational values they serve, indeed, embody, operate for the long term. These can only in part be explained idiosyncratically—by the personality of the CEO, the history of the firm, or the competitiveness of the industry, say. And they do not necessarily align by segment, but by ownership. Independent newspapers, house movers, and timber companies in the U.S. are cases in point.

Until the 1960s and 1970s, newspapers in the U.S. were almost entirely locally owned, often by a single individual or family. These owners may have had their own axes to grind—a political point of view to espouse, a road to build, a religious belief to promulgate—but their overriding aim was to build a community, to make it prosper and to do so in perpetuity. A few have had larger national, even international pretensions (e.g., The New York Times, The Globe and Mail, The Wall Street Journal, The Financial Times), but still their orientation was toward long-term societal development. Much of that has changed with the relaxation of ownership requirements in the U.S., Canada and elsewhere.²⁹ As the CEO of a major U.S. newspaper publisher remarked upon selling one of its papers to a private equity firm, such firms "have a lot of money, interest rates are low and they see newspapers as a potentially good investment with strong cash flows." This particular equity firm had only formed a year prior and had interests in the media and health care industries but otherwise no daily newspaper interest; it was all about

²⁶ Korten, David C. The Post-Corporate World: Life After Capitalism, San Francisco: Berrett-Koehler and West Hartford CT: Kumarian Press, 1999; Hawken, Paul, The Ecology of Commerce; Anderson, Ray C., Mid-course correction :toward a sustainable enterprise : the Interface model (Atlanta, Ga.: Peregrinzilla Press, 1998).

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²⁷ I thank Prof. Brian Talbot for bringing these cases to my attention and providing examples. Personal communication, December 18, 2006.

²⁸ I thank Peter Arbuckle for bringing this part of the cement industry story to my attention. Personal communication, December 2006 and January 2007.

²⁹ David Skinner, James R. Compton and Michael Gasher, 2005, Converging Media, Diverging Politics: A Political Economy of News Media in the United States and Canada, Lanham: Rowman & Littlefield.

“cash flow.” An analyst at a media research firm characterized the situation more bluntly: the sale of this daily newspaper reflected “the turbulence of equity holders trying to rebalance their portfolios and newspapers are properties to be bought and sold. They’re buying cash flow and tax benefits. It’s not the sort of religious commitment that you hope to get from newspaper owners.”³⁰ Nor is it a commitment to a community or the public’s right to know or to democratic values. Rather it’s all about moving capital around for maximum returns, returns today, this minute, this second. As it turns out, the way a newspaper generates such returns for its new-found owners is to lay off reporters, cut back the opinion page, shorten articles, increase advertising, and, possibly most pernicious, avoid offending those in power. It’s all about cash flow.

Some newspapers have resisted the trend and so it is here that insight into the conditions for long-term decisionmaking can be derived. In Florida, The St. Petersburg Times is owned by a locally controlled, non-profit foundation, the Poynter Institute. In the 1970s, Nelson Poynter, editor and president of the The Times, bequeathed his shares in the paper to the institute, stipulating that the institute dedicate itself to the teaching and promotion of journalism and that the newspaper turn a sufficient profit to support the institute. One result is that the paper, although not as profitable as the big, publicly-traded newspaper companies in the U.S., has indeed been profitable. But rather than push those profit margins ever higher (for some, up to 20%), it invests excess revenues in its core business, news reporting, and long-term projects.³¹

The Guardian in the U.K. operates similarly. It is owned by The Scott Trust, founded in 1936 by the owners’ family. The paper’s mission is “to secure the financial and editorial independence of The Guardian in perpetuity.”³² The New York Times pursues a similar mission in part by splitting its stock so as to allow the original family members to retain control while having public access to capital.

House moving is a segment of the construction industry that defies the trends—i.e., toward ever-faster construction, more and more short-cuts, and shorter-lived buildings (Wal-Mart now builds stores to last 15 years³³). House movers are almost entirely small, family-owned businesses with substantial capital investments—heavy-duty trucks, loaders, engines, mega-ton dollies, I-beams, cables—equipment that cannot sit idle for long. Movers lift buildings weighing hundreds of tons and roll them through city streets and down country roads. Some buildings are sturdy but others can crumble when old mortar—“sugar sand”—gives way with the slightest bump. Even the sturdy ones can crack with the stresses caused by uneven surfaces. And then there are power lines to squeeze under and gas mains to circumvent. All along the route everyone prays the cables hold and the hydraulic pumps maintain pressure. In more ways than one, this segment of the construction industry operates in a high-risk environment.

It is a spectacular engineering feat, moving a building, yet less than 20% of those who do it have engineering degrees. The reason, says a third-generation house mover, the 60-some president of a prominent Michigan firm, is that you can’t learn this kind of work in school. What’s more, the people who are good at it are “antsy,” they have to get outside and move buildings, not sit in glass towers measuring and calculating. So movers learn by doing, taking risks, experimenting and, maybe above all, talking to each other, even to their competitors. The house moving industry has two conventions a year where movers compare techniques. Competitors collaborate through equipment leases and contract hires for special projects.

In the house moving business then, knowledge is, first and foremost, first-hand knowledge. It is experiential and experimental. And it is collective, crossing competitive

³⁰ Katharine Q. Seelye, “Equity Firm Buys Paper in Minnesota,” New York Times, pp. C1, C4, December 27, 2006.

³¹ Joshua Chapin, “Poynter Institute points the way for newspapers,” Financial Times, October 16, 2006; accessed via FT.com; no pages given.

³² Joshua Chapin, “Poynter Institute points the way for newspapers,” Financial Times, October 16, 2006; accessed via FT.com; no pages given.

³³ Personal communication, Brian Talbot, 12/18/06.

boundaries and generations. The work is hard and dangerous, rarely fitting into a 9-to-5, Monday-to-Friday workday (in fact, 12-hour days including weekends are more the norm). No armchair owner can acquire this kind of knowledge, no distant investor or well-schooled engineer. Owner-operators acquire it as they work, as they invest and experiment and confer with others. And they do so when they are in the business for the long haul (so to speak). They build the firm, and they build the industry, all informed by knowledge acquired first hand and with limited transferability. If this Michigan owner is any indication, they pass on the assets and the knowledge to the next generation: he learned the trade from his father and grandfather and now his son is poised to take over the business. He may not have been maximizing his net present value, but independent operators probably rarely do. Instead, he was building a business and an industry for now and the foreseeable future and taking demonstrable pride in it all.

A half century ago, a timber company in Northern California stood out in the softwood industry. Whereas most timber companies of the late 19th and 20th centuries cut trees as fast as technologies and markets allowed and abandoned the cutover land for new territories, or acquired new timberland, or intensified production on their existing land, Pacific Lumber elected to stay put, to experiment with a business strategy premised on one tract of timber, one set of mills and one company town. It employed harvesting techniques that left enough trees for regrowth, and then some, and had a mill with state-of-the-art equipment, a company town with a waiting list, and, in the bank, a generous pension fund.

The key to the company's success, its officials regularly told stockholders, workers and community leaders was "restrained harvesting"—cutting less than what was possible, less than the industry norm: "The Company . . . has had many years of practice in restraining itself from overharvesting its timber resource, limiting itself to a harvest equivalent to the amount of growth," concluded a company historian, articulating what, by the 1980s, had become gospel among timber managers at Pacific Lumber Company. "It has been exercising this restraint for several decades, reducing production in some cases even in times of good markets of its products, which is most unusual in this industry whose sales are largely cyclical." Combining strategic land acquisitions and restrained harvesting, "The Pacific Lumber Company achieved sustained yield logging . . . the most important long-term goal of [the] Company."³⁴ Harvesting not what the market will bear, but what the forest will bear. Cutting enough and not too much. And it did so for the indefinite future, not for some calculated time period governed by technologies of extraction and discount rates in distant financial markets: "Although the Company takes pride in the hundred years that have passed," the company president wrote in a company brochure, "our time is well occupied with what we have to do to produce an even more dynamic history in the hundred years ahead."³⁵ Similarly, a 1981 letter to stockholders signed by the chairman of the board and a different company president read:

Management has evolved a long-term philosophy for the prudent management of the Company's valuable timber resources which we believe is unique in the forest products industry. As a result of adhering to this philosophy, despite short-term variations in industry or national economic conditions, management believes it has succeeded in providing Company stockholders with very satisfactory current returns and at the same time has contributed to the very significant increase in the value of the Company's timber resources.³⁶

³⁴ Ray Miller and Stan Parker, "Forestry or Forest Management at The Pacific Lumber Company," 15 page mimeograph, Pacific Lumber Company files, Scotia, California, undated but early 1980s, p. 4.

³⁵ "History," two-page TPL brochure found in company files, undated but, with the reference to "the hundred years that have passed," probably 1960s.

³⁶ Pacific Lumber Company, 1981 Annual Report.

Such statements were more than public relations. In the late 1980s, a consultant from the mainstream timber industry concluded that Pacific Lumber had curtailed production and forfeited current revenues, resulting in a pattern of “underharvesting” and “overcapitalized assets.”³⁷ This just did not fit the industry norm where, to survive, businesses constantly had to seek efficiencies, grow either outward or inward, maximize near-term revenue, and, above all, please consumers. But from the perspective of a company that emphasized quality in all aspects of its operations, one that valued and invested in both social stability and resource regeneration, one that put long-term economic security and sustained yield above immediate return on investment and consumer demand, the company philosophy made perfectly good sense. And those who lived it—those who worked in the woods or in the mill or played at the company’s ball field or hunted on its land, and whose children and grandchildren could expect to do the same—they knew it made sense. Restrained harvest ensured revenues—and jobs and company amenities—for one’s lifetime and probably for that of one’s descendants. All the condescending talk among industry analysts about “curtailed production” and “underharvesting” and “overcapitalized assets” did not change that fact. Restrained harvesting for the long term, from this perspective, was rational, socially, ecologically, and even economically rational.³⁸

These businesses are the antithesis of those run by absentee owners, by high-powered investors looking for the next big thing, by those always willing to move assets on a moment’s notice. It is tempting to think the differences are idiosyncratic, that time horizons are a matter of personal orientation. What these examples suggest is that time orientation is, in fact, very much a function of knowledge, its form and sources, and consequently of practice, of living in the material world, and, in turn, it is a function of structures of ownership, especially ownership that establishes a locus of decisionmaking that leans toward place--the local and residential--and away from the distant and absentee.

In business, especially in those segments of business that get covered in the business press and studied and promoted at business schools, mergers and acquisitions are the norm, ROI and shareholder value are the watchwords, the things that must be maximized at every turn. Knowledge of finance, not to mention government relations, is key; such knowledge enables a CEO to run equally well an automobile company, a chemicals company, and a defense contracting firm.

By contrast, place-based companies are the antithesis, not just small and privately held, but, like ecosystems and human cognition, bounded, bounded in part by their structure (e.g., owner operator) but in part by their knowledge base: Not anyone can successfully run an independent newspaper, a house moving business, or a timber company with restrained harvest. No amount of financial acumen can substitute for the requisite knowledge in these operations. They must have a form of knowledge that is acquired largely within the organization (i.e., experiential), and acquired over a long period of time, including intergenerational time. Such organizations are therefore inherently long term in their orientation, not just in the participants’ values and beliefs, but in their very practice. Companies with porous boundaries, on the other hand, companies that re-organize constantly, that stress mobility among all factors of production, that focus on the margin for maximum immediate gain rather than on the base (financial, social and, with natural resource firms, the ecological base) for secure, sustained gain, are necessarily in it for the short term. Put differently, when times change, mobile businesses pack up and move on; they restructure or dissolve or declare bankruptcy or shift production offshore; executives fire the

³⁷ Consultancy report to John Campbell, The Pacific Lumber Company, signed by Kass Green and Warren S. Halsey of Hammon, Jensen, Wallen & Associates, Incorporated, Oakland, California, dated October 1, 1987, five pages; and referred to in congressional testimony of John Campbell, executive vice president, Pacific Lumber Company; hearings, US Congress, October 5, 1987, p. 27.

³⁸ For a detailed case study of the Pacific Lumber Company, see chapter 6, Princen, The Logic of Sufficiency; on ecological rationality, see chapter 2.

workers and bring in other, more cooperative workers or find another firm to manage, in or out of the industry.

In sum, the more absentee, distanced, mediated and diffuse the ownership, the more short term oriented is the business. Conversely, a long-term orientation is more likely when owners are tightly connected to the business, whether through location, economic dependency, or immobility of assets. What's more, the more closely the knowledge base is tied to locality—physical and social, natural resource and livelihood—the more likely a long-term orientation is adopted.

From Business Organization to Climate Policy

By themselves, place-based businesses illustrated by these cases are a long ways from climate policy. But they may well suggest the necessary conditions for long-term decisionmaking that eventually will constitute a meaningful climate change regime—i.e., one that is institutionalized on the ground, at the level of knowledge and practice, of direct interaction with the material world, whether moving buildings, cutting trees, pumping water, or plowing soil. This is where long-term thinking must ultimately locate, not in the halls of Congress or Parliament, not in the World Bank and Gates Foundation, not on Wall Street and K Street. All the declarations in the world about the long term are meaningless if on-the-ground decisionmaking is structurally and unavoidably short term.

This, then, suggests that a climate change regime must, first and foremost, be a political (and ecological) economy regime, a set of organizations and institutions and economies structured from the ground up and from patterns of decisionmaking that are “naturally” long term. It suggests that structures that encourage individuals and organizations to apply the brakes on endless expansion and every-increasing speed, that mimic the boundaries of ecosystems and nutrient and water cycles and reproduction, that build in sustained satisfaction (as opposed to the fleeting pleasures of consumption) are the baseline conditions for long-term policymaking. It suggests that technological fixes and market corrections will forever be up against the inherent short-termness of the very institutions and economies they are trying to fix.³⁹

Put differently, to advocate technological and market fixes is to presume that climate change and other long crises do not represent a fundamental challenge to contemporary, modern industrial life. It is to presume that business-as-usual really is the norm, the desired state of affairs from which adjustments are to be made, that real catastrophe comes when we tinker with a beautiful machine—the modern economy—not with things like water supplies, soil, the ozone layer, and the carbon cycle. It is to presume that re-calibration is all that is needed, better specified objective functions, more rational approaches to risk, a lower discount rate. And such re-calibration will have to come from elites, from a specialized knowledge base accessible only to the few. The fact that such knowledge is neither attached to nor dependent on biophysical functioning is immaterial. In fact, the answers, this view has it, will have to come from, and be implemented by, those very same actors who have benefited so handsomely from the current political economy, an economy that performs as if there are endless frontiers, as if brakes are unnecessary on a vehicle designed to always move forward.

This is wishful thinking in the extreme. For a more realistic, even ‘realist’ approach to climate change and the role of business, analysts and policymakers should target actors and structures that innately embody a long-term orientation. Place-based business is one such area. Another is the very language and concepts that drive the current brake-less political economy. Prime among them are the notions of present value and discount rate.

³⁹ On the connection between work, consumption and time see Princen, “Enough Work, Enough Consumption,” in *The Logic of Sufficiency*. Regarding the business conditions for long-term planning and decisionmaking, it may well be that a major impediment is the lack of a level playing field with respect to government regulations. When the regulatory future is more certain or predictable, or less variable, firms will plan well into the future. I thank Hugh Dyer for raising this point; Personal communication, February 19, 2007.

The Discount Lens

Imagine a lens that fits over a pair of glasses and diminishes the future of every object viewed. One looks at the nation's constitution and sees an interesting historical artifact but no relevance to today's issues, let alone next year's. One looks at a school and wonders what all the fuss is about, all the property taxes paid, teachers employed, and children's time consumed, especially when we all know those children will grow up to be adults anyway. One looks at a military cemetery and questions the sacrifice, the good of all those lost lives and how they can possibly be justified.

It is a dreary, jaded vision these lens afford. Certainly no one would deliberately construct such a world view. Or would they? Walk into virtually any professional school in the U.S. (and probably in any other industrial or fast-industrializing country)—a school of business or engineering or public policy or education or natural resources—and one can find such lens being crafted and worn every day. They go by names like net present value and cash flow discounting, internal rate of return, hurdle rate, and payback. Central to all of them, what technically speaking are “present value” methods, is the concept of discount rate. In the professional schools and in the boardrooms and legislatures and banks, especially the banks, discount rate is gospel, the way to handle the future: discount it! Treat the future as something no one really wants, or wants to think about (certainly not the far future). After all, as Lord Maynard Keynes once said, in the long run we're all dead.

The discount rate allows analysts and money managers and investors to treat the future as simply a variant on the present, only less valuable. The discount rate ultimately comes from the general interest rate of the economy which comes from the behavior of markets, including capital markets, most of which are notoriously short term in orientation, even in a conventional business sense: it's tomorrow's stock price, next month's consumer confidence index, next quarter's earnings that matter.

If the notion of a discount rate had stayed in its original and, arguably, proper place—capital accounting, especially the investing of large sums of money (see below)—and did not seep out into all things financial, indeed, all things commercial, even material and ecological, then life might have gone on with no issue of the long term: the future value of writing a constitution, of schooling children, of defending the homeland would be self-evident and normal. In general, people's default position regarding the future would always be to appreciate it, not depreciate it. And this would extend from big constitutional and security issues to “little” issues like human rights and poverty and environmental protection. Instead, the notion of discount rate has permeated virtually all of life, certainly economic life, private and public, and our use of resources. Understanding how this came to be requires a bit of business history. For that I turn back to the 19th century, the time of the railroad barons and, in the U.S, the urge to build a great industrial nation. Detailing this piece of history illuminates not only how we got here, but how we might go elsewhere in our time orientation. It might help us craft a different lens, one that focuses on the future and ties its value to the very real concerns people have for that future, including concerns for the rule of law, the development of children, the territorial integrity of the nation, not to mention concerns for a stable climate, healthy food, and safe water.

Railroaded into the Future

The discount rate as incorporated in methods like capital accounting and net present value arose at a particular juncture in industrial history, namely a time of huge and largely unprecedented capital investment.⁴⁰ But it wasn't just the size of railroads and irrigation canals that stirred the

⁴⁰ Much of the current debate on discount rates centers on questions of the rate itself (10% vs. 7% vs. 1%, for instance), of the ethics of assigning monetary value to a life (human and otherwise), feasibility analysis vs. cost-benefit analysis, trade-offs between the economy and the environment, future benefits vs. present consumption, saving vs. consumption. See Daniel A. Farber and Paul A. Hemmersbaugh, “The Shadow of the Future: Discount Rates, Later Generations, and the Environment,” *Vanderbilt Law Review* 46: 267-304, 1993.

risk takers and intimidated the fiscal conservatives. It was the durability of the investments: rail lines and canals and telegraph lines and, later, dams and highways, were built to last, and last a long time. They had to be; it was the very physical nature of such things. A locomotive and its cars could tame the wilderness, erasing time and space, but only with great power and great mass. For that, road beds and ties and rails had to be massive and durable. Unlike more conventional investments back then—machines such as the McCormick reaper, small-scale factories, let alone seed and fertilizer—all this was as long-lived as any humanly-constructed thing one could imagine. What's more, just as the benefits of such investments would be realized over a long time period (or so investors hoped), the costs of that capital would be too (as, no doubt, investors feared). And those benefits and costs would proceed inexorably, and, if they did not accrue as planned, punitively.

Until this time (mid and late 19th century in the U.S.) and until mid-20th century in other industries (e.g., telegraph, telephone, oil, chemicals), investments were evaluated for immediate returns or, at most, for returns into the coming year or two. To put it simply, one built the barn because it had to be built. One collected materials, invited the neighbors over, and raised it. From that time on, while the barn was used, all subsequent decisions were about crops and livestock. The barn was just there, incurring no annual costs beyond maintenance. By contrast, a railroad builder had to borrow huge sums of money which had to be paid—with interest—over the life of the railroad, or at least for many years, even decades. Cash had to flow in not just to make payroll and generate a profit, but to cover those capital costs—year after year, for a long time.

One of the first people to connect this “long time” cost reality to the “near time” investment decision was Arthur Mellen Wellington, a “locating engineer” (one who decided where the tracks and support buildings should be located, a decision in part physical and in part monetary) for Michigan Central Railroad and other railroads between 1870 and 1887. In a 1887 book, The Economic Theory of the Location of Railways, he argued for cost methods capitalized over time: “Another question as to which the locating engineer should have some definite ideas,” wrote Wellington, “if only to check the vague visions of his board of directors, is as to the probable growth of traffic in the future, and the justifiable present expenditure to provide therefor.”⁴¹ He offered a present value table to “calculate the present value of the net savings,” and included a formula. The second edition gave greater emphasis to capital budgeting, excoriating those who didn't employ such methods for their waste of resources:

There is indeed pitiable waste resulting from the conditions outlined . . . as has resulted from the location of the entire railway system of the Prairie States of the West . . . In view of such facts, the distorted preeminence given by engineers and by those who teach and employ them, to the pettiest detail of how to build the separate works which make a railway to the neglect of the larger questions of where to build and when to build, and whether to build at all, has in it something at once astounding and discouraging.⁴²

Business historian Scott Dulman points out that Wellington “combined the financial concept of compound interest with a demographic observation of compound railroad traffic growth to establish a discount rate.” Although technically flawed, that insight—making the essential connection between interest rates and discount rates—was to be taken up years later by theoretical economists. Otherwise, Wellington's “work remained largely unknown among managers,” writes Dulman.⁴³

Such debate is remarkably ahistorical. It implicitly takes the basic concept as valid and then toys with technical choices. In this paper, by contrast, I put present value in a socio-historical context thus ascribing no necessary a priori validity to the concept, certain no presumed validity for long crises.

⁴¹ Scott P. Dulman, “The Development of Discounted Cash Flow Techniques in U.S. Industry,” The Business History Review, Vol. 63, No. 3 (Autumn, 1989), pp. 555-587; accessed through JSTOR; quote on p. 558.

⁴² Quoted in Dulman, p. 560.

⁴³ Dulman, p. 560.

The mining and public utilities industries did experiment with present value techniques in the early 20th century. Chemical and automobile industries followed. Applications were nevertheless limited. General Motors, for example, developed return on investment methods that “appear to have been used primarily for projecting only the next year’s performance,” writes Dulman. And despite “zealous campaigns” by economic engineers and business school academics “only a small number of industrial firms had adopted the managerial technology of present value analysis before the Second World War.”⁴⁴

Thus, net present value or, as it was called then, cash flow accounting, was a major break from the past, a technical innovation to be sure but, most importantly, a conceptual innovation, a new way of thinking about the future. “The salient factors in the development of modern capital budgeting methods were the education, experience, and personality of its pioneers, who demonstrated extraordinary foresight and perseverance,” concluded historian Dulman. “The importance of applying DCF [discounted cash flow] techniques is not obvious because the capital budgeting process is concerned with the profitability of the firm in the long-term future. In contrast, a decline in sales or market share, the failure of an engineering design, or the accumulation of large inventories is immediately evident if the relevant performance data are available.”⁴⁵

So here was a way to insert a temporal dimension into what would otherwise seem to be a largely atemporal matter: how much money will I make if I install this machine, construct this building, hire this worker? On the face of it, this innovation would appear to be a precursor of what is needed now in the 21st century in the face of global warming, biodiversity loss and other long crises. Because railroad tycoons and, later, oil drillers and dam builders, necessarily had to think in terms of decades, today we need only extend that thinking to centuries. The problem, however, lies in that core element of the present value calculation, the one that connects the future to the present, namely, the discount rate.

In principle, those who employ a present value method such as net present value or internal rate of return choose a discount rate to reflect their true underlying valuation of future benefits (and costs) relative to present benefits (and costs). Of course, to do so willy nilly, to just pick a rate out of thin air would be entirely subjective, not much better than basing an investment decision on a hunch or the alignment of the planets. It would hardly meet the goal of making business, especially capital investment, a scientific and wealth-maximizing enterprise, a societal project begun in the later 19th century and intensified with the construction of business schools, the triumph of neoclassical economics (over the “soft”, more philosophical and social “political economy”), and the emergence of engineering economics (pioneered, it seems, by railroading’s location engineers), not to mention the society-wide exuberance of early industrialization. So in this modern project, analysts and investors needed a more rational basis for determining the discount rate. That would come not from engineering but from theoretical economics, beginning in the 1930s and culminating in work of the 1950s with titles like The Theory of Investment of the Firm, Capital Budgeting, and Investment, Interest, and Capital.

The story is long, full of abstractions and technical distinctions, but the short of it is this: In the search for a general theory of the economy, one grounded in market behavior, marginal decision making and the price mechanism, economic theorists constructed an economic ideal: because complete mobility of the factors of production (land, labor and capital) is necessary for well-functioning markets and efficient outcomes, markets, including capital markets, should be integrated. And because all significant decisions in a capitalist system are ultimately about capital and because the price of capital is given by interest rates, the great unifying measure of well-functioning markets would indeed be interest rates. In fact, according to this theoretical ideal, a general interest rate across the entire economy will emerge as these market conditions are

⁴⁴ Dulman, quotes on pp. 565, 583.

⁴⁵ Dulman, quote on p. 586. Emphases added.

approximated. Capital theory (including the time value of money) became a generalization of economic theory with an extension into time.⁴⁶

Thus, in theory, discount rates ultimately must come from interest rates which, in turn, are set in capital markets (along with central bank control of the money supply). In practice (note: in practice now, not in theory), those interest rates, as noted, are notoriously short term, oriented to today's news, today's stock prices, today's currency exchange rates, this month's consumer confidence indices, and this quarter's earnings. As a result, discount rates are notoriously (from the perspective of long time horizons) high: the future doesn't matter much, not in capital markets, not in commodity markets, and not in a commercial, capitalistic society's treatment of its resources and waste sinks, including those of the global commons.

The irony is that present value methods arose to extend economic decision making into the future, to construct a time frame much longer than ever countenanced. And yet, due to the underlying notion of discount rate, such methods are structurally unable to infuse resource extraction and waste sink loading with a time frame commensurate with the time horizons of climate change, biodiversity loss, persistent toxic substances and other long crises. What's more, when the notion of discount rate is combined with the imperative for economic growth and the presumption that future generations will be wealthier, future costs are always cheaper and thus those who generate such costs in the present need not be accountable.⁴⁷ A better prescription for endless frontier mining can hardly be imagined.

For those of us committed to extending that time frame, to finding a means of matching human decision making to ecological realities, the story of discounting might be dreary. But there is a silver lining: It is just a story. The theoretical ideal is just a construction. And so is the discount rate, one concept highly useful for 19th century railroad tycoons and 20th century oil and automobile companies to be sure, but one woefully inadequate for the needs of the 21st century. Moreover, to the extent the notion of discount rate has filled the heads of professionals as "the way" to account for the future and has permeated the media and lay public, it can be undone. There is nothing "natural" about such decision making, except possibly in the financial world. In all other worlds, that of constitutional democracy, of child and elderly care, of national security, of art and national treasures, of human rights and justice, and of the environment, a long time frame is perfectly "natural." Our adapting mind with its dual temporal cognitive capacity nearly requires it to be so. This is the real source of hope. But a realist notion of hope requires good stories as well as concepts and language that re-orient our thinking and decisionmaking on substantial matters such as global warming, that is, that re-orient our thinking to the long term. For that, concepts like precaution and sufficiency and prudence offer such hope, because they aim directly at the need to reverse the trends and get on a sustainable and equitable path. I propose one more, the "Janus extension."

The Janus Extension

Present value techniques may have extended the time frame of conventional business decision making in its time. Few technologies demanded such massive structures—rails, sidings, locomotives and cars. And few structures required so much financial capital, right upfront and well before any benefits, and certainly before any net benefits, could be realized. The railroad thus represented more than a revolution in transportation, more than an erasing of time and space. It was a revolution in financing. Because the benefits and costs played out over long periods and because builders couldn't possibly come up with the materials and labor by their own means, investment, huge investment, had to be attracted. And those investors had to be convinced that the scale—physical and temporal—made sense. Present value techniques were one means.

⁴⁶ Garnett L. Bradford and Stephen E. Miller, "An Analysis of Alternative Net Present Value Capital Investment Decision Models," Working Paper, WP102798, October, 1998.

⁴⁷ I thank Jack Manno for articulating this point regarding future wealth and accountability. Personal communication, February 2007.

Logically, then, for the purpose of preparing for the effects of climate change and other such environmental problems, extending the time frame even further, from two decades to three, say, or to four or five decades, would be an improvement, a step in the direction of aligning the biophysical and social systems. But there's a risk here. Searching for the one right time horizon is much like the economists seeking, and finding, a universal numeraire for capital and the entire economy, namely, interest rate. A universal time frame would contradict the particularist nature of ecology—i.e., the fact that each organism, each species, each community is uniquely constituted in its place, its biological and physical environment, and hence in its temporal scale; that each has its own rhythm.

The real problem is that present value techniques bracket time by the project itself (the railroad, the dam, the power plant), from the initial plan (scouting, measuring, sampling, designing) to the end of the project's useful life. That may make financial sense, but it does not make ecological sense. The reason is both ecological and behavioral. The ecological ideal would be to identify an appropriate indicator, or rule of thumb, or principle, one that is malleable according to the ecological context, to the rhythm of the species or population or community, and one that is adaptable according to the social context. I'll call it the "Janus extension." For a proposed capital project, the time horizon would extend backward in human history capturing what we know about similar projects. This is the social dimension looking back. It would also look back into geological and ecological history capturing what we know (scientifically and via indigenous knowledge) about natural variability in, for example, precipitation, temperature, erosion, sedimentation, wind, predator-prey dynamics, and so forth. This is the biophysical dimension.

At the same time, the time horizon for the proposed capital project would extend forward, on both social and biophysical dimensions, to the likely end of the project, the point when the rust in the joints resist all lubrication, the concrete in the dam cracks, the mortar between the bricks turns to sugar sand, the radiated steel is too brittle to withstand the pressures. This is the point of decommissioning, when the project is worthless or dangerous or both, and when the land and the water must be restored. The forward time horizon is sufficiently long to account for the expected costs and consequences, and their distribution across the relevant population. Anything short of that is, indeed, too short in time, too bracketed in scope to qualify as a "sustainable" project. And if the technology is so novel or so pervasive or so unpredictable that projections backward and forward cannot be made, then it too can hardly qualify as "sustainable." Each project might be financially prudent,⁴⁸ given prevailing notions of the time value of money, but they are not socially and ecologically prudent.

The Janus time extension is thus not an issue of years or even life cycles and nutrient flows. It is an ecologically meaningful way of connecting a driving force in modern industrial economies—capital investment—to ecological functioning. And it does so by situating the full range of decisions in ecosystem functioning, a necessary condition for sustainable practice.

In sum, on the face of it, the task now, in light of long crises that require investments, public and private, for many decades, even centuries to come, is to extend that time horizon yet further. Even larger sums of capital may be needed. And, of course, more appropriate discount rates chosen. But here's the rub: what is "appropriate" to healing the planet is not what is appropriate to Wall Street investors. Ultimately this is because discount rates derive from interest rates which in turn derive from highly distanced relations among absentee owners whose only motive can be marketplace performance, that is maximizing short-term returns on investment. These very same people may be deeply concerned about global warming, but their investments rarely, or marginally (e.g., "socially responsible investing"), reflect it. Al Gore undoubtedly has a large

⁴⁸ A test of such financial prudence might be the willingness of private insurers to cover the plant and its products for the relevant time period.

stock portfolio, much of which may very well be “green,” but those who actually make the decisions, from the fund managers to the corporate managers must act on today’s prices, today’s consumer confidence and, at best, next quarter’s earnings.⁴⁹

Conventional financial tools, including present value techniques are not up to the task of infusing a long time horizon. They cannot express a long term orientation any better than a clergyman can express the spirituality of stock trading. This should not be interpreted as an innate human inability to hold a long time horizon. Rather it suggests that the economic sphere, as practiced, is not the primary realm for addressing critical environmental problems. Instead, the economic sphere, being the major driver of patterns of material appropriation (production, consumption, distribution, and disposal) must be tightly circumscribed. It must be limited to that which is inherently short term—e.g., manufacturing, retailing, consuming—leaving to other spheres that which is inherently and necessarily long term. A newspaper owned by a foundation (St. Petersburg Times and the Poynter Institute), a timber company owned by a church (Collins Pine), and a fishing community (Monhegan) and a timber community (Menominee) governing its collective harvesting are illustrative.⁵⁰ More, many more, need to be discovered and devised.

Toward a Neo-Prudential Order

Conventional wisdom has it that humans are inherently short term. They are. But they are also inherently long term. If there is a human temporality it is the dual capacity to think and act both short term and long term. It would be nice if there was a single literature on this topic, or even a field of psychology or organizational behavior, say, that sorted it all out: Under these conditions humans tend toward the short term, under these the long term. I have yet to uncover such a literature or field, suggesting that, as imperative as the need is today to understand long-term decisionmaking, the questions have been barely posed, let alone answered. Instead, we have bits and pieces and, necessarily, a lot of inference and speculation.⁵¹

And yet for all that theoretical and empirical haze, a picture of the long term does emerge. The clearest image is that humans have all the reason in the world, the physical world and the social world, to be long-term thinkers. This is not just because of the current need (the temporal gap of increasing environmental time scales and decreasing decisionmaking time scales) but it is because of the species’ need and, hence, the selective pressure, biological and cultural, to adapt to new environments—savannah, coastline, desert, forest, tundra; family, clan, neighbor, tribe, nation; farm, village, city. And it is that very adapting, through evolutionary history and through one’s life history, that defines the species, not its size or strength or speed or built-in defenses (all of which are weak relative to other species, especially our ancestral predators and competitors). Humans’ key adaptation is the brain, large and differentiated, with the capacity for both immediate response and foresight, for the ability to escape predators and image a future, to act now and to plan for the future, to satiate and act to enhance the future, in short, a capacity for short-term and long-term thinking and acting.

The immediate-future dichotomy, the cultural adaptation to plan next year’s crop and save the seed, the capitalist ethic of reinvesting earnings, all served humans well, at least through roughly the 19th century and early 20th. Today, though, it appears to serve well those whose vision of the good life is material progress, that is, ever more consumer goods at ever lower prices produced with the cheapest wage labor and natural resources possible. A thorough history of the

⁴⁹ There is another realm of finance for which these assertions do not pertain—namely, insurance, especially re-insurance. This is an area ripe for research.

⁵⁰ I don’t develop the timber examples here. The fishing example can be found in Princen, 2005, The Logic of Sufficiency, and many more in the common property literature.

⁵¹ Writes psychologist Robert N. Emde: “Future-oriented processes have not received anywhere near the same attention in theory or research as have post-oriented and present-oriented processes” (p. 437, in Haith et al). His concern is psychology but it could extend to just about all other disciplines, with exceptions being history and literature and, maybe, international relations.

modern materialist project would be needed to show how this vision was constructed and by whom. For now, though, three major constructions of the contemporary social order, ones biased to the short term, can be identified and, from these, alternatives can be posited that point to what I term a “neoprudential order.”

Survival. One construction is that of knowledge and the understanding, achieved directly for some, intuitively for others, that life is, at root, all about day-to-day survival. The desperately poor exemplify this condition. They care little about the past and can only hope for a future. Their existent is about meeting immediate needs and hence their time frame is immediate. All those in the lower strata, this reasoning has it, are fixated on the here and now—and we would be too if we were suddenly thrust into such conditions.

Consumerism. Another construction is consumerism, driven for the past 100 years or so by economic theory, marketing research, and a concerted effort by lay and expert alike to throw off the shackles of the past. To be progressive, this project has had it, is to reject “old things,” past ways, sage advice, even historical struggle, condemning such sentiments as “traditional” or “backward.” To live the good life is to celebrate today’s abundance, its conveniences and low prices, its speed and thoroughness, and to pine for the “next big thing.” Goods are good and more goods are better. It’s not about the future, not about saving for a rainy day, not about owning property free and clear, not about eschewing debt. Rather, moderns work now and consume now; and, with all the resulting wealth so generated, the future will take care of itself, brighter than ever.

Investing. A third construction is the modern conversion of the very idea of investing from that of ensuring long-term material growth and security to something more akin to gambling. A vestment is an article of clothing, particularly one that signifies authority. Whether political or religious or both, kingly robes and papal gowns convey institutionalized privilege and responsibility. Vestments are inherently future-oriented, and not just a few years but the indefinite future. The monarchy and the papacy are not temporary institutions; their adherents expect them to last forever.

An investment is thus a commitment to a set of rights and obligations over a long period of time. When I “invest” in my children, I indeed clothe them, but I also shelter and nurture them and teach them the ways of the world. It’s my right and my obligation. And I do it to last a lifetime—mine and theirs. Similarly, when a capitalist invests earnings in new plant and equipment, new technologies, and new skills, this is not a get-rich-quick scheme; it is a wealth creation scheme, one that for a true capitalist continues indefinitely, enabling more wealth, more material security, more meaningful work and community, not more consumption, more gadgets and conveniences, more shopping and gaming of the system.

By contrast, financial advisers tell their customers to manage their portfolios aggressively, to move assets quickly and continuously to get the best return on every dollar—that is, the best short-term return. Those with the assets to so “play” the stock market certainly have privileges (they can put their funds wherever they like, whenever they like, for any period of time), but they have few if any responsibilities for the consequences of the resulting capital flows, consequences that are largely invisible and untraceable. That’s for governments and civil society to deal with, this view has it. The investor’s task is to get the most return, and now. Modern “investing” is thus a freewheeling game of chance, free of authority and free of obligations, free of a past and free of a future. It is gambling.

These three constructions of the contemporary political and economic order—the immediacy of survival, consumerism, and “investing”—reveal not only how constructed is that order, but how vulnerable it is to contradictory (and largely invisible) processes such as irreversible ecological decline. The focus on short-term survival of the poor is to distract attention away from the causes of extreme poverty. What is more, it is to presume that all those who are not winners in the global race for ever-increasing wealth value nothing but basic needs. It is to deny that such people care for their children and grandchildren and elderly, that they wish to

leave a positive legacy themselves, that they desperately want to save the seed and generate some surplus, not to mention govern themselves and build institutions to ensure their livelihood and that of their progeny.

A prudential order thus is one that accords the same “higher” values (e.g., legacy, savings, self-governing) to all peoples, rich and poor, capitalist and subsistence, right along with the “lower” values (e.g., immediate needs, indulgence, gambling). It rejects Maslow’s hierarchy of needs, a notion long ago disparaged by psychologists but still embraced by political scientists, economists, businesspeople and policymakers.

Similarly, the assumption that consumerism improves lives is tantamount to saying that a human’s baser motives—a constant flow of consumer items, acquired irrespective of need and of the social and environmental consequences—will somehow translate into higher motives—cooperation, peace, democracy. The current fashion in business circles of targeting investment to the “base of the pyramid,” those billion or so people who are not fully integrated into the global consumer economy, follows as an extension of current practices, all as if the frontier is alive and well, that natural resources and waste sinks exist in endless abundance, that the solution to problems of the environment, poverty and violence lie in more consumer choice, more spending, and, to make it all happen, better returns on investments (mostly the investments of those who already have plenty to invest).

A prudential order, by contrast, would presume that those “at the bottom” seek, above all, food and energy security (as opposed to greater choices on the grocery shelf), and dignity and self-determination (as opposed to the chance to work in a factory set up by wealthy outsiders and to spend money in markets created by yet more outsiders). It would presume that if the ecological frontier has ended, so should the political frontier, the culture that seeks solutions via unending economic growth, technological wizardry, and individualized responsibility.⁵²

Finally, in a prudential order investments would verge on the sacred; they would be commitments of obligation to one’s future and the future of others. No one could escape responsibility for such investments by hiding behind the skirts of “consumer sovereignty” and the “free market” and distanced commerce.⁵³ A prudential order would be a sustainable order, at once social and ecological, an order that deliberately seeks and enhances those conditions that lean humans away from their short-term propensities and toward their long-term propensities.

Getting the Metaphor Right

To construct such an order is in part a linguistic exercise: building a language, literally and conceptually, of the long term. Concepts like precaution, zero waste, and sufficiency are part of that project. Here I suggest another: getting the metaphor right.

There might be something of an element of self-fulfilling prophecy in the prevailing assumption that humans are inherently short-term thinkers. Analogous to the “sucker’s payoff” in Prisoner’s Dilemma (PD) games, if I think everyone else is thinking short term (and doing so to position oneself for strategic advantage) then it behooves me to act short term, even if I otherwise feel inclined to act long term. What is more, if the situation does follow the structure of the PD, then even if I expected others (or a significant number of others) to act long term, it is still rational for me to act short term. In other words, short term is a dominant strategy—if the PD structure pertains.

But as we know from cooperation studies, with some simple changes in the structure of the game, the dominant strategy changes. Repetition or direct communication or other means of extending the “shadow of the future” suddenly makes the long term rational, even a dominant strategy in some cases.

⁵² I thank Hugh Dyer for tying the culture of the ecological frontier to the culture of a political frontier. Personal communication, February 19, 2007.

⁵³ See “Conclusion: To Confront Consumption” in Princen, Maniates, Conca, Confronting Consumption (Cambridge: MIT Press, 2002).

So if one picks PD or, say, Garret Hardin's formulation of "the commons" (actually open access) and its inevitable tragedy, as the primary metaphor for environmental policymaking then, yes, we can predict short term thinking. But if we modify the metaphor, or choose a different one, to make it closer to actual human behavior, then the situation looks different. Short-term thinking no longer looks "natural" or normal or the default behavior. And, as Robert Bellah reminds us, "metaphors may be appropriate or inappropriate, but they are inescapable." Getting them right is, among other things, an issue of good institutional design because, although "we create institutions, they also create us: they educate us and form us—especially through the socially enacted metaphors they give us, metaphors that provide normative interpretations or situations and actions."⁵⁴

One way to modify the image is to add a dimension to the prevailing metaphors: iteration for PD, communication and self-organization for the commons (open access). The advantage of this approach is that it requires no heroic assumptions—the very same narrowly self-interested actors now act as if others and the future matter. But choosing a different metaphor may be more fruitful, especially if it is more attuned to the question at hand, namely, living within global ecological constraint over the long term. For this, then, and in light of the history of the discount rate, I propose the metaphor of "saving the seed."

The presumption that humans are inherently short term in their thinking derives from two intellectual traditions. As discussed, the economic addresses time issues via interest and discount rates, offering the bank as the metaphor: what return would you expect if you gave up use of your money for a period of time (interest rate); and by how much would you diminish a pot of money if you could receive it now rather than in the future (discount rate). Maybe the financial metaphor for humans' valuing of the future is apt in commercial transactions and other commercial exchanges. But the issue at hand is not, in the first instance, commercial: it is exchanging, organizing, and living, all within immutable ecological constraints. So for the normative purpose of nudging decision making away from the short term and toward the long term, I suggest a metaphor from agriculture, rather than finance—saving the seed. Other settings may work as well—parenting, care of the elderly, community building, establishing a personal legacy, writing a constitution. But I choose seed saving because the seed is the quintessential activity that ties human need (eating) to the land, or, most broadly, to the biophysical (producing and reproducing). What is more, it is an activity that has stood the test of time—some 15,000 years anyway. So what is the metaphor of saving the seed?

To sit in a hut in the middle of winter, stomach aching from hunger, and look at, but not touch, the seed for next season's crop, is perhaps the supreme act of restraint. It's not denial, not sacrifice (in the negative sense of the word). It's doing without now so as to ensure a harvest, and hence survival, later. That it has happened a million times across cultures and across millennia attests to its potency, its ubiquitousness, its centrality in organized, settled societies. Of course, there were those who could not resist the temptation, but they were selected out, at least culturally if not biologically. Protecting the seed has been essential to survival and reproduction of the family and the community, likely entire societies.

The enactment of "saving the seed" begins with the annual planning—deciding which crops, where will they be planted, how much land will be cleared, how much left fallow. After planting, seeds are harvested from select plants and stored in secure containers.

The practice is universal, from the most primitive to the most technologically sophisticated societies. It is a practice that spans seasons, years and lifetimes. And it is continuous and cyclic—one is always planning for, growing, saving and planting seed. One might infer an implicit time frame of a season, but because the process is continuous and cyclic, the implicit time frame is actually the indefinite future. So this metaphor is inherently planful, unlike the

⁵⁴ "Introduction: We Live Through Institutions," in Robert N. Bellah, Richard Madsen, William M. Sullivan, Ann Swidler, and Steven M. Tipton, *The Good Society* (New York: Alfred A. Knopf, 1991), quote on p. 12.

banking metaphor which only requires a numerical calculation. It implicitly takes for granted that humans can sketch out a course of action in time and space that helps ensure their survival. Such capacities, I have shown above, are perfectly compatible with biological, psychological, anthropological, and historical evidence for human long-term thinking.

As a metaphor for contemporary human decisionmaking—agricultural and otherwise—under conditions of global ecological constraint, saving the seed plays out in several ways:

- 1) Rather than having an objective of maximizing a monetary return for a given investment, saving the seed is about ensuring a crop. It is about food security, not about an abstraction (money) and the status displays it enables via accumulation and consumption.
- 2) It generates questions of sufficiency—how much land is enough, how much too little, to grow the seed and ensure the crop? Such questions are alien in the banking metaphor.⁵⁵
- 3) The future is appreciated, not depreciated as with positive discount rates.
- 4) The common sense of saving the seed is intelligible to everyone. One does not need special training, esoteric knowledge, or sophisticated concepts to get it.
- 5) Saving the seed is inherently ecological. Plants have evolved the capacity to produce seeds; animals have devised means of collecting them—e.g., squirrels burying nuts, picas storing hay, bees making honey, humans putting up caches.
- 6) Normatively, saving the seed is about prudent behavior, about not taking unnecessary risks for self and others, about foregoing the bonanza for the steady income, about building foundations not rearranging the furniture, about integrating work and play and the building of community.

The practical challenge, of course, is to substitute the seed metaphor for the prevailing banking metaphor and do so in real-life situations. And it is to find other metaphors that meet criteria such as:

- i. promotes human security
- ii. is sensitive to excess
- iii. has a long time horizon
- iv. is intuitive
- v. dovetails with ecological processes
- vi. is prudent.

It's a tall order, but an order worth pursuing as the temporal gap (expanding environmental time scales and contracting decisionmaking time scales) widens and long crises such as global warming bring irreversible and disastrous change.

⁵⁵ They are not alien to some financial principles, I should add. Spending the interest, not the principle; diversifying one's portfolio; living within one's means; all these have ecological counterparts. See Princen, "Ecological Consonance," paper in progress.