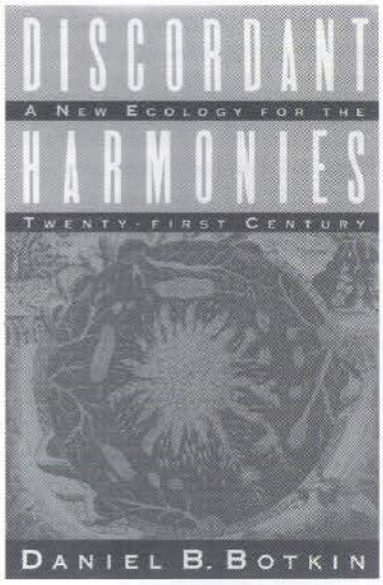
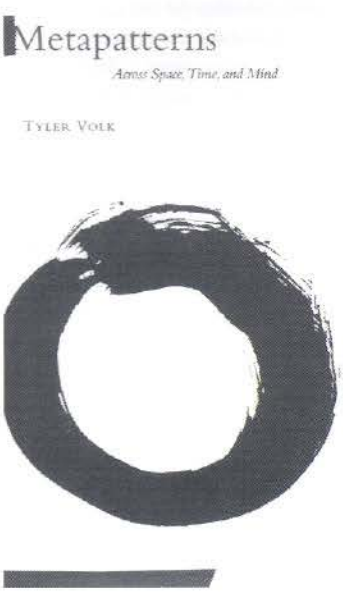
Review Essay

Wild Knowledge: Science, Language, and Social Life in a Fragile Environment, Will Wright, Minnesota, 1992.

Discordant Harmonies: A New Ecology for the Twenty-First Century, Daniel B. Botkin, Oxford, 1990.

Metapatterns: Across Space, Time, and Mind, Tyler Volk, Columbia, 1995.





Science and The Paradox of Harmony

By Luke Wallin

One night not long ago I attended a meeting of the faculty and Ph.D. students in MIT's Planning Department. One professor spoke of the impressive ability of his colleagues to generate and publish case studies. But the problem is, he said, despite the apparent success of each study, the general situation of society and ecology grows steadily worse.

We might think of the elegance of atomic theory, and the horror of actual atomic blasts for people and ecosystems. Or we could look at the harmonies within ethnographies, and their uses by intelligence services or the marketing divisions of corporations. This paradox of harmony – its production by scientists in the very teeth of a deteriorating planet – is usually dismissed as too obvious for rigorous concern. After all, aren't we simply talking about the difference between theory and practice? Or between explanation and action? What would it mean to *theorize* the relationship between harmony within science and discord outside?

Every experiment is a universe: control groups provide order, dependent variables offer novel but measurable surprise. From within each problem, hypothesis, and attempt at solution, an image of serenity radiates outward. Kuhn called events and their descriptions within experimental frameworks 'normal science,' to contrast them with revolutionary changes at higher levels of theory. This 'normality,' multiplied by every experiment in every lab, depicted in media as 'science,' suggests an entire culture of calm control. Every subspecialty has its jargon, its long apprenticeship, its rituals of grantmaking. Young scientists grasp the code: cage-rattlers need not enter here. The culture of science requires a judicial temperament as condition of entry, as passkey to play the game of imagining new 'normal' harmonies, then announcing them in due course to the nonscientific world. Read through a copy of *Nature, Scientific American, The American Scientist, The Sciences, or Discover* magazine, and you come away with the impression of a vast, controlling empire of scientists at work, each one filled with restrained joy for a particular focus, and the collective whole pursuing benignly an abstract 'truth.'

What is really represented is the dominant culture of modernity, which bankrolls science and projects hierarchy and order onto its official domain of 'the facts' which represent 'reality.' Science is held by its sophisticated interpreters, such as philosopher Karl Popper, to be about observation and measurement – never 'ultimate' entities – yet the public still believes scientists achieve privileged access to the world itself. This realism extends beyond the entities taken as real, to the descriptive character of the harmonies implicit in science and science reporting.

Within this paradox, scientists are able to concentrate on their individual niches, *imagining* an orderly universe of discourse for their objects of study, preserving the social benefits of their conservative institutions. In turn, the fruits of their labors are gathered and used by others to create social and physical disharmonies on a planetary scale.

The three authors discussed below attempt to rethink the concept of harmony in relation to science. By focusing on notions of sustainable reason (Wright), metaphors of nature (Botkin), and metapatterns across space, time, and mind (Volk), each offers a path through the paradox of harmony, and hence toward a scientific practice which no longer contributes to a discordant world.

SUSTAINABLE REASON

Will Wright, a sociologist and mathematician, observes in *Wild Knowledge* that, 'As a mathematician I was struck by how the appearance of rational coherence can be derived from essentially arbitrary foundations, and by how a formal mathematical structure would always appear as a set of arbitrary assumptions to the mathematician and as a basis for natural explanations to the physicist.' (p. xiii)

Wright argues that nature (imagined as a realm of objective facts which we can know) and humans (as described by psychology and economics) are incoherent notions which are destroying the planet. This incoherence, this lack of sustainability and ecological reason, derives from conceptual mistakes in our worldview; the beliefs that suggest we can achieve privileged access to objective reality, and that we are discrete, Hobbesian individuals.

Against privileged access views, Wright draws on well-established anti-foundationalism arguments from a broad range of thinkers, from Thomas Kuhn to Richard Rorty. He contrasts appropriately humble claims to knowledge with religion's insistence on absolute truth. The latter embodies a kind of hubris, and blocks social criticism of knowledge claims.

This point applies to the hubris of physics, economics, and psychology as well. For example, take the famous problem of facts and values. If one accepts physics' descriptions of the world as a realm of 'objective facts,' there is no place for values. Active human agents, minds, and their values, are left out of the 'lawful' world, and so ethical and esthetic disputes reduced to shouting matches. Relativisms, such as emotivism, leave the way clear for bulldozers and chainsaws. Furthermore, this simple-minded and false account of moral experience often cloaks itself in the hubris of scientific authority.

The bulldozers and chainsaws, the burning of rainforests, and legions of other environmental and social problems, are an important part of Wright's argument. In addition to philosophical points, he invokes commonsense against the destructiveness of 'technical reason.' What is needed is 'wild knowledge,' meaning knowledge open to social critique, and 'sustainable reason,' which does not destroy.

The corollary to the 'external world' of facts is the modern individual, known by 'behavioral science' as a bundle of desires driven by 'natural law.' (Usually, he says, the law of consumer advertising.) For a critique of this notion, Wright relies on McPherson's *The Political Theory of Possessive Individualism*. He suggests that, despite the compelling technical arguments (and the viewpoint of common sense) that something must be radically wrong with our 'official' scientific and cultural worldview, people still embrace it as their dominant worldview. While many argue that this theoretical 'crisis of the foundations of knowledge' doesn't matter, because science offers the 'inevitable' benefits technology, on a planetary and intergenerational scale, there are no benefits. Technology and technical reason are destroying human life and its ecological base.

Most importantly, Wright suggests, we must recognize that language has a social dimension, and should be open to social critique. His model is health vs. medicine. Medicine is a technical science which, while holding powerful cultural authority, is open to critique from the common sense viewpoint of health. Ordinary people are often competent to challenge medical authority when health falters. Claims about IUDs, mastectomies, silicone implants, etc., must be evaluated by their effects. In the same way, 'official' claims about environmental risk must be judged by their effects (not by techno- 'risk assessors').

Wright attempts to spell out an application of these pragmatic ideas via a key concept: the priority of language over individual humans. We can only act as humans through speaking a language. Language, therefore, is logically (not temporally) prior to the existence of any individual human being. A language which is sustainable and ecological will contain the possibility of its own existence, its own continuation. Thus a social self-reference is necessary for collective health.

Finally, Wright moves to the books of Kenneth Burke on rhetoric, for an account of how language works in its socially sustainable dimension. All language is classificatory, positing known vs. unknown terms, the familiar vs. 'the other.' Otherness is a linguistic necessity, and the tension to resolve it is a necessary condition of living language speakers. Particular classificatory systems will always be somewhat conventional, and none will ever hold a privileged access title to truth and certainty. But some such system will be necessary for talk to continue. Otherness, at its conceptual base, is wildness. The effort by active speakers to articulate and thus *tame* otherness is a necessary condition of continued language use and social life. Wright's pragmatic critique of realist conceptual holdovers leads toward a new understanding of the meaning of pragmatism for our time. And this meaning lies in the effort to develop a sustainable social and ecological rhetoric that moves beyond the dominant root metaphors of science and technology.

METAPHORS OF NATURE

Daniel B. Botkin's *Discordant Harmonies* could be read as an application of Wright's approach to the science of Ecology. In detailed discussions drawn from a professional lifetime, Botkin shows precisely how harmonious but false theories and the 'normal science' generated from them produced disastrous policies.

By pointing to ice sheets, volcanoes, and other disruptions of living systems, he argues there is no 'natural' mature state of nature which we can identify, value, and expect. One of his most disturbing and interesting themes is a critique of the normative uses made of the concepts of 'ecological succession' and 'climax forest.'

Botkin approaches this through discussion of two foundational myths of Western culture. Each derives from an ancient lineage, and claims many supporters today. Yet each myth is false. The first often serves as the broadest philosophical assumption of developers; it is the belief that *there is a balance of nature which humans cannot seriously undo, no matter what mischief we enact.* The second, often an article of deep faith for conservationists, is that *there is a balance of nature which humans can fatally disturb – and perhaps already have.* Both parties believe in *some* concept of nature in balance. However, Botkin outlines how ecologists have recently come to recognize the pervasiveness of change in nature:

> *Until the last few years, the predominant theories in ecology either presumed or had as a necessary consequence a very strict concept of a highly structured, ordered, and regulated, steady-state ecological system. Scientists know now that this view is wrong at local and regional levels – whether for the condor and the whooping crane, or for the farm and the forest woodlot – that is, at the levels of populations and ecosystems. Change now appears to be intrinsic and natural at many scales of time and space in the biosphere. (p.9)*

He discusses Tsavo, a 5,000 square mile national park in Kenya. When it became a park in 1948 its landscape was dry and flat, heavily forested but devoid of many large animals which had been killed around the turn of the century. David Sheldrick, its first warden, devoted years to building up the population of elephants and other species. He built thousands of miles of roads for tourist access, brought in water, and carried out an aggressive campaign against poachers. By 1959 he'd had too much success: the elephants were knocking down trees and other vegetation, and turning the park into a 'lunar landscape.'

Scientists were called in to study the situation. They recommended that 3,000 elephants be shot to keep the population within its food supply. Sheldrick nearly agreed, then reversed himself and fell back on his faith in the old balance of nature idea. He said that

> *the conservation policy for Tsavo should be directed towards the attainment of a natural ecological climax, and...our participation towards this aim should be restricted to such measures as the control of fires, poaching, and other forms of human interference.(p. 10-11)*

Botkin comments,

> *At that time, the phrase 'natural ecological climax' was taken to mean nature in a mature condition, the result of a long series of stages that occurs after a catastrophic clearing of the landscape and, once attained, persists indefinitely without change. (p.17)*

The park's trustees sided with Sheldrick, and the result was that the elephant population reached and surpassed the points

characterized as crisis, overshoot, crash, and die-off. The once-green park became a desertified and nearly lifeless wreck. This result showed decisively that, at least at 5,000 square mile scale in that place and time, change and not stability was intrinsic to the ecological community.

These examples show the fallacy of trusting that nature's balance will 'take care of itself.' But other examples just as readily show that human activity can upset nature at various scales. One could point to the many extinctions wrought by human 'development' – irreversible errors.

And yet, a conservationist cannot help but fear that, if change is admitted as intrinsic to nature, as 'natural,' then one can never argue against the changes developers want to make. Botkin says we must distinguish between desirable and undesirable *rates* of change. And we must recognize our responsibility to choose the ecosystems we want – and not simply pretend God or Nature has already created those which are ethically 'good.'

Aldo Leopold, in his 1948 *A Sand County Almanac*, called for a 'land ethic,' which would value a 'state of harmony between men and land.' Botkin agrees, but wants to update the kind of knowledge needed to achieve harmony, and to clarify the concept of a *new* harmony. Whereas Leopold had repeated the ideas of 'forest succession' and 'climax forest' as natural goods, Botkin shows how various states of forests and other ecosystems change in response to unpredictable patterns. To claim 'goodness' for a particular pattern of ecosystem stability, then, would require more than reliance on the old 'balance of nature' idea. Other criteria, such as our preference for historical periods (such as the way forests looked to early European explorers), or our desire to protect a single endangered species at the expense of others, must be admitted into the debate.

What can we know of the larger, chaotic patterns that give rise to the temporary, local harmonies we call ecosystems? Botkin briefly discusses the philosophical issues of chaos and order, but rather than take a position on ultimate issues of determinism, randomness, and free will, he uses the language of chaos theory as a metaphor for what ecologists observe.

> *The philosophical issues are more difficult for the physicists than for the ecologists. In the forests of Isle Royale, infrequent severe storms are an important cause of the death of trees. From a tree's point of view, if one can use that expression, the occurrence of such a storm is unpredictable. The effect of the storm on the tree's survival and on the evolution and adaptation of trees in a forest is a result of events that cannot be distinguished, at the level of response open to trees and other living things, from a truly probabilistic event. ...Nature as perceived by living things is a nature of chance. (p.124)*

To understand the larger pattern of discord within which, from time to time, living systems of increasing complexity emerge, is not to fall into a hopeless relativism about ecological values. Rather, it is to take greater responsibility (1) for our own conceptualizations of nature, through working to grasp the history of our metaphor systems, and (2) for our management decisions about areas of nature. At the level of theory, we must move beyond such master metaphors as NATURE IS DIVINE ORDER, NATURE IS AN ORGANIC CREATURE, AND NATURE IS A GREAT MACHINE. After splendid historical accounts of these ideas, Botkin proceeds to discuss new metaphors drawn from computer hardware and software, and to show how we can appreciate their power in mirroring the complexity we now recognize, without falling under their spell and elevating them to the status of reified myths. Ultimately, we must accept a humble, open, and pragmatic attitude toward natural systems. Never again should anyone assume the hubris of 'privileged access' certainty. Botkin concludes with a call for massive investment in biological science, and the introduction of interdisciplinary ecological studies into educational programs on a far wider scale. His solutions may be a bit too institutional and apolitical, but readers can adapt his important ideas to their own opportunities.

METAPATTERNS ACROSS SPACE, TIME, AND MIND

Tyler Volk is an Earth Systems scientist at NYU. He has worked as a computer modeller for NASA, specializing in the ocean's carbon cycles, and made original contributions to a variety of subjects from growing gardens in space to the extinction of dinosaurs. In this book he draws upon his undergraduate degree in architecture, and applies structural thinking to every scale known on earth. If Wright's book offers a pragmatic challenge to technical reason, and Botkin's work applies such a challenge to Ecology, Volk's ideas generalize Wright's perspective even further. By seeking out 'metapatterns' that connect spatial and temporal structures at vastly different scales, and collecting thousands of instances of these 'crossing' into metaphorical and cultural space, Volk provides a creative way of addressing the paradox of harmony.

The term 'metapatterns' comes from Gregory Bateson, with whom Volk studied. Bateson would pull a crab from a bag, and ask students how the two claw-equipped limbs shared a common anatomy, despite differences in pincer size. How do they compare with lobsters? And how does this generalized anthropod pattern compare with the mammalian pattern, drawn from a parallel exercise with a human and a horse? Bateson suggested 'discarding magnitudes in favor of shapes, patterns, and relations.' He is remembered for goading students and readers to search for 'the pattern that connects.'

Volk has taken off from this idea and, after twenty-odd years of thinking about it, produced a kind of comparative anatomy of the biosphere itself. Chapters 1-6 catalogue and meditate on universal patterns in space, while chapters 7-10 do the same for time. But this is no realist grabbag of ontological 'parts'; Volk constantly cuts back and forth between nature and culture, to show the profound ways our imaginations mirror and project metapatterns.

This is the book's beginning:

> *We began life as simple, floating spheres. As eggs we popped from follicles in ovaries of mothers-to-be. Fertilized by sperm in fallopian tubes, dividing again and again, our spheres persisted. But when we nestled and flattened into womb's wall, and, later, groped with arms and kicked with legs, an interplay between the sphere and its contrary began. This interplay forever follows us: by day we walk as upright sticks; at night we curl into fetal balls.*

From the electrons within hydrogen atoms to the sun and moon, to the human skull and to an autumn grape, sphericity emerges as a principle of geology, biology, and, metaphorically, of psychology as well. The remaining 'spatial' chapters discuss sheets and tubes, borders, binaries, centers, and layers; the 'temporal' subjects include calendars, arrows, breaks, and cycles.

In the chapter on borders, Volk discusses the ways scientists often impose them,

> *isolating parts of nature for study. Galileo framed Jupiter with a telescope to watch its moons as a system. ...Fusion physicists confine plasmas in magnetic bottles. ... I still recall the flash of delight I felt as a student during a lecture when I was struggling to learn the theoretical engineering tool called control volume analysis. [What moved me was] the insight that the technique consisted of little more than slapping imaginary conceptual borders around a system. ...*
>
> *Modellers... may lump all marine waters into a single bounded "box" – or three, five, seventeen, or even thousands – and then compute the crossing fluxes of these control volumes. Climate modellers cover the mathematical Earth with grids of such*

boxes. In the workings of science, barriers and pores, walls and bridges, are probably isomorphic to the synergy of spheres and tubes. (pp.65-66)

Volk's plenitude of examples of the borders metapattern, drawn equally from culture and science, offers the reader a different *sense* of the structure of nature. How might we apply this sense to the paradox of harmony? If we follow Will Wright in viewing our largest problems as basic pathologies of organization, it seems to me that one could perform a 'metapatterns' analysis of the relations between specific scientific enterprises and the world they influence. For example, perhaps creatively 'slapping conceptual borders' around areas of society and/or ecosystems at different scales, as in control volume analysis, could forewarn us of 'cross-border' problems.

Borders function as bulwarks against the forces of disruption. They cloak creatures and their internal parts against the ravages of the exterior world – the ionizing, lysing, dissolving, jolting, combusting, dispersing, bursting, rotting, eating, and crushing world. Borders hold at bay all that would destroy the difference between being and environment; they prevent universal homogenization.

Life's borders accomplish much of their bulwark functions with a simple and generic design. This design can be seen in cell membranes made of lipid molecules; in tree bark, with its tiny cellulose cages of dead cells; in mammal skins of keratinized, flattened, dead cells; also in animal hairs, scales, and feathers; in virus shells of identical protein subunits; in bird nests and beaver dams of twigs and sticks and mud. This generic design is even used for bounding the precious information contained in chromosomes, whose ends are buffered by very short sequences of DNA repeated thousands of times. (p.52)

Consider some examples of dissonance between science and social life mentioned in Wright's book: IUDs, mastectomies, silicone breast implants. Each seemed a triumph of technical reason, a harmonious bit of theory and engineering within its narrow conceptual borders, but loosed on women these technologies were often disasters. Did scientists lose sight of the different, more complex borders within living bodies? Was this to misunderstand the metapattern of borders? What about Botkin's case of the starving elephants in Tsavo? If the park's borders had been more porous, allowing the animals to come and go in search of food, the herd might have flourished. Instead scientific rigor was wasted crafting 'natural' policies within bounds too small for them to work. 'The pattern that connects,' as Bateson said, is the key to understanding links between human and environmental events. There might be as many applications of Volk's metapatterns to the paradox of harmony as there are individual scientists thinking about the role of their specific case studies, ethnographies, experiments, and theoretical voyages in the 'big picture' of biospheric health.

If Wright is correct to raise the ideal of 'wild knowledge,' measured analogically by the medicine/health divide, and if Botkin presents a masterful case of doing just that, Volk's work sets out a broad and creative perspective within which the wisdom of any particular scientific event might be assayed. Each of these books offers fresh ideas, not rigid prescriptions, and implies practical ways in which scientists might become more sensitive to the larger disharmonies that surround us all.

Luke Wallin is an Associate Professor of English at the University of Massachusetts, Dartmouth, and Senior Research Associate at the Center for Policy Analysis.

Reviews

Gordon Laird and Sue Zielinski (eds) Beyond the Car: Essays on the Auto Culture. Toronto: Steel Rail Publishing / Transportation Options, 1995

By John Sandlos

You're in the driver's seat. Put in the keys, start the engine and head out to the highway. Ease into the fast lane, pull down the top and let the wind flow through your hair. You're free. Or so the story goes. Soon you hit a traffic jam. The air becomes unbreathable. You shut out the wind, the sun and watch the world through your windshield as if it were on a television screen. You are stuck between two points on a map, out of place, out of time and out of luck. Ah, to be free in America.

Born out of the 1993 Second International Conference on Auto-Free Cites, Sue Zielinski and Gordon Laird's *Beyond the Car* examines the "freedom" of the auto culture in North America, and its continuing emergence as a global phenomenon. The various contributions trace the rise of the of the auto industry in North America, the subsequent industry inspired demise of public transportation in major urban areas, and more recent campaigns of resistance such as the spontaneous construction of traffic calming "woonerf," or living islands, in the streets of the Dutch community of Delft. In doing so, the book broadens the discussion of the automobile from a simple pollution reduction exercise to a more imaginative re-creation of life without the automobile. Appropriately, a diverse group of authors have contributed to this project (transportation activists, urban planners, green economists and local politicians), all of whom attempt to provide a loose blueprint for a less car dependant society. The broad visions that becomes clearer as on reads through the book is one that includes communities with green space rather than parking space, a bicycle revolution, clean and efficient public transportation, safe places to walk, ample space for children to play, and the return of street level interaction between neighbours. It is, as the editors suggest in the introduction, an "arrangement of options, possibilities and ideas, so that people can make their own decisions about the automobile."

As such, *Beyond the Car* succeeds on many different levels. Most importantly, the diverse essays in the volume remain focussed and complementary. Film criticism concerning car movies rests easily alongside urban planning literature, or thoughts on the global economy. While printing diverse essays in their casual conference form can be the weakness of many volumes, the warmth, humour and the depth of the contributions in *Beyond the Car* suggest that this is not the rule of thumb. Sean Hayes' hilarious "Auto-Biography: An Alternative History of the Car," and Eric Mann's personal account of his anti-pollution activism in Los Angeles are particularly interesting examples that affirm the value of this approach.

Most importantly, *Beyond the Car* succeeds by revealing the extent to which a technological tool can dominate the lives of its users. By choosing one form of technological freedom in the form