Holarchy, Panarchy, Coyote and Raven:
Creation Myths for a Research Program
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March 31, 2008

"The way we see the world affects the world we see" Salman Rushdie (2002)

PREFACE

This little book is based on a keynote presentation at the first Symposium of the Institute for Coastal Research at Malaspina University-College in Nanaimo, British Columbia, on March 31st, 2006. It explores several questions regarding the nature of interdisciplinary research, and the role of community participation within it, and leads into the question whether interdisciplinary community-based research can help to resolve complex resource management issues on the British Columbia Coast.

In the present text, the argument laid out in the original powerpoint presentation has been amplified, and references—including several to material appearing since the presentation—have been added. But it must be emphasized that this brief survey represents only a very sketchy path through a vast, fascinating and rapidly changing territory.

I chose the title because it seems to me that the essential problems we are facing in the field of resource management and sustainability generally—the essential barriers to meeting the crucial challenge, which is the challenge of implementation and compliance—are not only scientific, structural or institutional but also, more fundamentally, ethical, individual and personal.

As we study the problem of assuring individual compliance with collective intentions to achieve social purposes, we need much more attention to personalities and beliefs, and to the languages and images that drive them. Holarchy and Panarchy offer artistic images of structure derived from science, but Coyote and Raven introduce the personalities flowing from myth and narrative, the forces that shape our decisions and actions after our science has been absorbed and our conscious reason engaged. They call attention to the significance of the cultures and traditions from which they were born. In Habermasian[1] language, from research into System, they call us into Lifeworld. They take our stories, with all their inherent contradictions, from the tower to the yard—from academic abstraction to the pit of practice.

My conclusion from this paper is a strong encouragement to the Institute for Coastal Research to pursue its goals for an inter-disciplinary (or trans-disciplinary) program of

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[1] The massive two-volume work on the theory of communicative action (Habermas, 1984, 1987) is of course the basic reference. But it is not easy to read. The main points of interest here can be gleaned from teaching notes of Arthur Frank at the University of Calgary (Frank, 2007) or of Malaspina's own Marshall Soules (Soules, 2007), both accessible at the internet addresses given in the bibliography.

community-based research and active community-based coastal resource management, but to pursue those goals in a program that includes an essential focus on language and what we usually call the humanities.

I suggest that a response to many questions about resource management has three distinct layers, which seem to correspond rather nicely to the three conventional divisions of disciplinary work: natural sciences, social sciences and the humanities. From this overview of interdisciplinary research, I turn very briefly to some new views of the roles of science and other ways of knowing in such research. I leap very quickly over the fascinating but more familiar questions associated with the first two layers—natural sciences, social sciences—in the disciplinary trilogy, in order to focus on the challenges of meaning, myth, stories and beliefs as the touchstones by which we might learn to adapt our behaviour so as to live together as part of a sustainable ecosystem on this one small, complex, blue planet.

CONTENTS

A FEW RANDOMLY SELECTED, REALLY RELEVANT QUESTIONS OF INTEREST IN BRITISH COLUMBIA

> *Should we develop hydrocarbon resources offshore BC?*
> *Ought we to organize all BC fisheries on the basis of ITQs (individual transferable quotas) or DEPs (defined access privileges)?*
> *Should we kill BC coastal livelihoods by adopting Ecosystem-Based Management?*
> *Ought we to introduce full land-based treatment of Victoria sewage, contrary to (almost) all sound scientific advice?*
> *Should we move responsibility for oceans on the West Coast from Canada to BC?*

The academic response to any of these questions must surely be to suggest that we need to develop a new and enlarged research program to find the right answers. Such research, we are told, will have to recognize that we are dealing with the complex dynamics of coupled socio-ecological systems characterized by profound uncertainty—maybe indeterminacy—and limited controllability (Holling and Gunderson, 2002).

Academics will almost certainly recommend that the answers will have to be found in the context of integrated, precautionary, ecosystem-based management, conducted through open and transparent modes of computer-supported cooperative, inclusive, participatory, place-based interactive deliberation.

Persuasive as all that is, it leaves us more or less where we started--with tough questions to which we see no easy answers.

But are these really the right questions anyway? Aside from these direct dilemmas of resource management, there is a very challenging intervening question to be faced, which seems always to come up even when we think we have the answers to such problems, and think that we know what we ought to do. This question is
> *Why do we seem unable to do the right thing?*.

And that invites subsidiary questions:
> *What is "the right thing to do that we seem unable to do"?*
> *What do we mean when we say "seem" unable to do?*
> *What do we mean by "do"?*
> *Indeed, who is this "we"?*

Academic research can't easily deal with these questions on their own. There is too much context to consider. There are too many particularities of place. There are too many 'oughts' and 'shoulds' in these questions (a red flag to objective scientists and analytical philosophers).

It might be easier if we were asking about what I should do, or you should do. But in this case we are asking questions about what "we" should do in decisions that are bound to visit adverse consequences on somebody, probably somebody who doesn't even know the question is being asked, probably somebody who doesn't know the research is being done, and almost certainly somebody who has little or no voice in how the answer is being worked out or how the resulting decisions will be implemented.

Notice one key point about all these resource-related questions, however: we are starting with a problem to be addressed, not with a disinterested curiosity-driven search for understanding cast in traditional disciplinary terms. We are trying not just to bring to bear many perspectives on the problem, but also to integrate many disciplinary and methodological traditions and perspectives in order to come to agreement on action. Some people would call that sort of work trans-disciplinary research, or even post-normal science. (Nowotny, 2003; Pereira and Funtowicz, 2006; Funtowicz and Ravetz, 2008).

It's so easy for the outraged environmentalist or the scornful media columnist to lament the inability of governments—or anybody—to just do the right thing, to get on with action to address our acknowledged social challenges, or even crises. Notably though, it does seem to get tougher—at least initially—to thrash out agreement on concrete action when all these stakeholders and all these commentators have to deal with each other in a room together. What *seems* so obvious becomes more problematic, and the *views* begin to shift. Sometimes people begin to *see* another *perspective*. They begin to *hear* their neighbours or fellow citizens. And then they confront the mystery of trying to catch up with the *meaning* of all the action and all the machinery in motion, all the attempts to do something, outside one's own field of vision. This is a mystery well captured by the famous John Cleese line *What's all this, then?*

The major underlying question remains, who is this "we" when we come to resource management?

CHALLENGES IDENTIFIED BY THE NATURAL SCIENCES:
HUMAN IMPACTS

Let's look behind this question of why we can't seem to do the right thing, even though contemporary science seems to offer incontrovertible evidence of massive adverse consequences flowing from present human action, and to underline a clear and pressing need for change.

In journals like *Ecology and Society*, one sees more frequent reference these days to a remarkable paper by V. I. Vernadsky that appeared in English translation in 1945, but apparently appeared in Russian in Moscow in 1943. Vernadsky says (in translation)

> Mankind taken as a whole is becoming a mighty geological force. There arises the problem of the reconstruction of the biosphere in the interests of freely thinking humanity as a single totality. This new state of the biosphere, which we approach without our noticing it, is the nöosphere… The important fact is that our democratic ideals are in tune with the elemental geological processes, with the laws of nature and with the nöosphere. Therefore we may face the future with confidence. It is in our hands. (Vernadsky, 1945, pp9, 10)

Central to Vernadsky's point is the notion of agency—the belief that we could, if we chose, alter our conduct in light of the anticipated consequences.

From a parallel biological perspective, Peter M. Vitousek suggests that "Human-caused global environmental change is with us now." (Vitousek, 1993, p. 1862). He suggests that nearly 40% of potential terrestrial net primary productivity (NPP) is being used, dominated or converted by human activity. Updated estimates range widely, but are not lower.

Approaches to the issue also vary among researchers, and other styles of analysis such as the ecological footprint analysis developed by Wackernagel and Rees at UBC already suggest that we will need more than a few planets of the scale of Earth in order to support the coming world population at the level of wellbeing of the present so-called developed industrial countries (Wackernagel and Rees, 1996)[2]. Whether you trust this analysis to the full or not, the point about the scale and growth of population and, more particularly, the increasing scale and destructive potential of technologies used to provide the resources, ecological services and life support needed to meet not just the basic needs but the material aspirations of that growing population, is fundamental.

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[2] Interestingly, the idea was well-captured by the Science Council of Canada in an important and much-overlooked report (Science Council of Canada, 1972) presaging its regrettably overlooked series on the Conserver Society. In the Epilogue to the 1972 Report, for example, is the observation that "In the minds of some, we [in Canada] could already be considered overdeveloped because we are using our resources at a rate that, if copied by all the people of the world, would be beyond the capacity of the planet Earth to sustain it." (SCC, 1972, p. 38)

Echoing Vernadsky's challenge of agency, Vitousek continued his comments with the observation that

> *We're the first generation with the tools to see how the Earth system is changed by human activity; at the same time we're the last with the opportunity to affect the course of many of those changes…it is up to us.* (Vitousek, 1993, p.1873)

Ronald Wright, in his 2004 Massey lectures, published as <u>A Brief History of Progress</u> argues

> *There is no room for rational doubt that we are apes…But unlike other apes, we tamper, and are tampering more than ever, with our own destiny….The most compelling reason for reforming our system is that it is in no one's interest. It is a suicide machine (Wright, 2004) .*

In her widely quoted acceptance speech at the ceremony where she received her Nobel Peace Prize, Kenyan environmental activist and now Cabinet minister Wangari Maathai—in an interesting echo of the Vernadsky vision of the nöosphere from more than sixty years ago—called for a move away from that suicide machine:

> *Today, we are faced with a challenge that calls for a shift in our thinking, so that humanity stops threatening its life support system….In the course of history there comes a time when humanity is called to shift to a new level of consciousness, to reach a higher moral ground (Maathai, 2004).*

If this sense of urgency is warranted, as it seems there is growing agreement that it is[3], why do we find it so hard to move off 'business as usual (BAU)'? Why does our BC Progress Board, for example, insist that we must develop policy "with extreme economic sensitivity", or leading federal cabinet ministers assert that we need to "balance" our need for energy security with responsible environmental stewardship, while ensuring that Canada's economy continues to be "a world leader, producing jobs and wealth for all Canadians." (Prentice, 2007) Why do we not see our present human and institutional system as a suicide machine? Why can we not stop threatening our own and our grand-children's life support systems? Why can we apparently not exercise agency properly?

This last question lends itself to research across many traditional disciplines and, I suggest, is our new interdisciplinary, maybe trans-disciplinary, researchable question. Maybe we have to begin to answer this question by going back to a prior question as to why we do not see the world or the system we are in for what it is.

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[3] On the issue of climate change, for example, there is a wide range of new statements of concern, emphasizing the pressing urgency of immediate policy change. In his new book, James Lovelock, the author of the GAIA hypothesis, suggests that humanity may have a hard time surviving the consequences of global warming (Lovelock, 2006). Though the book has been criticized as alarmist, he prefers to see it as a 'wakeup call'. Again he suggests that the future is in our hands. One could also see the Amsterdam Declaration (2001) or the November 2007 Summary for Policy Makers of the Synthesis Report from the Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC, 2007, at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf).

The natural sciences offer us several answers to the question of why we cannot see clearly the system we are in and the role we are playing in that complex system. A great deal of fascinating research on perceptions, cultural transmission, cognitive dissonance and similar topics seems relevant —binocular vision, parallel processing channels for orienting ourselves in the world as distinct from acting in it, and so on—along with the continuing debate about the 'reality out there'.

Richard Dawkins is, as usual, provocative. He asks

> *But if solid things are mostly empty space, why don't we see them as empty space? The answer lies in our own evolution. Our sense organs, like all our bits, have been shaped by Darwinian natural selection over countless generations. You might think that our sense organs would be shaped to give us a 'true' picture of the world as it 'really' is. It is safer to assume that they have been shaped to give us a useful picture of the world, to help us survive. In a way, what sense organs do is enable us to construct a useful model of the world and it is this model we move around in. We are jumped-up apes and our brains were only designed to understand the mundane details of how to survive in the stone-age African savannah.* (Dawkins, 2004, p. 46)

Savannah-dwellers, of course, did not recognize the full theoretical complexity of their world at the time. Nor did they have complicated cross-scale, multi-jurisdictional decision structures nested within complex ecosystems to apprehend and comprehend. Again, we are coming across the dual character of our relationships, as humans embedded in and formed by a natural system, but also exercising agency to alter it.

In describing how such agency should be exercised, the mantra now on the theoretical side is 'integrated precautionary ecosystem-based management and cross-scale governance in complex dynamic systems characterized by profound uncertainty and limited controllability (Holling and Gunderson, 2002, Liu, Dietz et al, 2007). How exactly to carry out this assignment is not altogether clear, of course.

We as humans are exercising dominion over nature, profoundly altering the ecosystem, in some sense acting as a superior authority, while at the same time we are intrinsically embedded in that same ecosystem, forming only a part of that overarching natural framework, with the dynamics of the human system only a subset of the overall ecosystem dynamics. An entity of this sort, Janus-faced, looking down to components but also up to a more encompassing authority, complete in itself but also a part of a larger organism, has been labeled a holon, and the system overall—a multi-layer hierarchical structure—as a holarchy. (Koestler, 1967, 1978)[4].

Despite all the complexity and uncertainty in the systems under study, however, the natural sciences, monitoring the evolution of the world we live in, suggest very strong
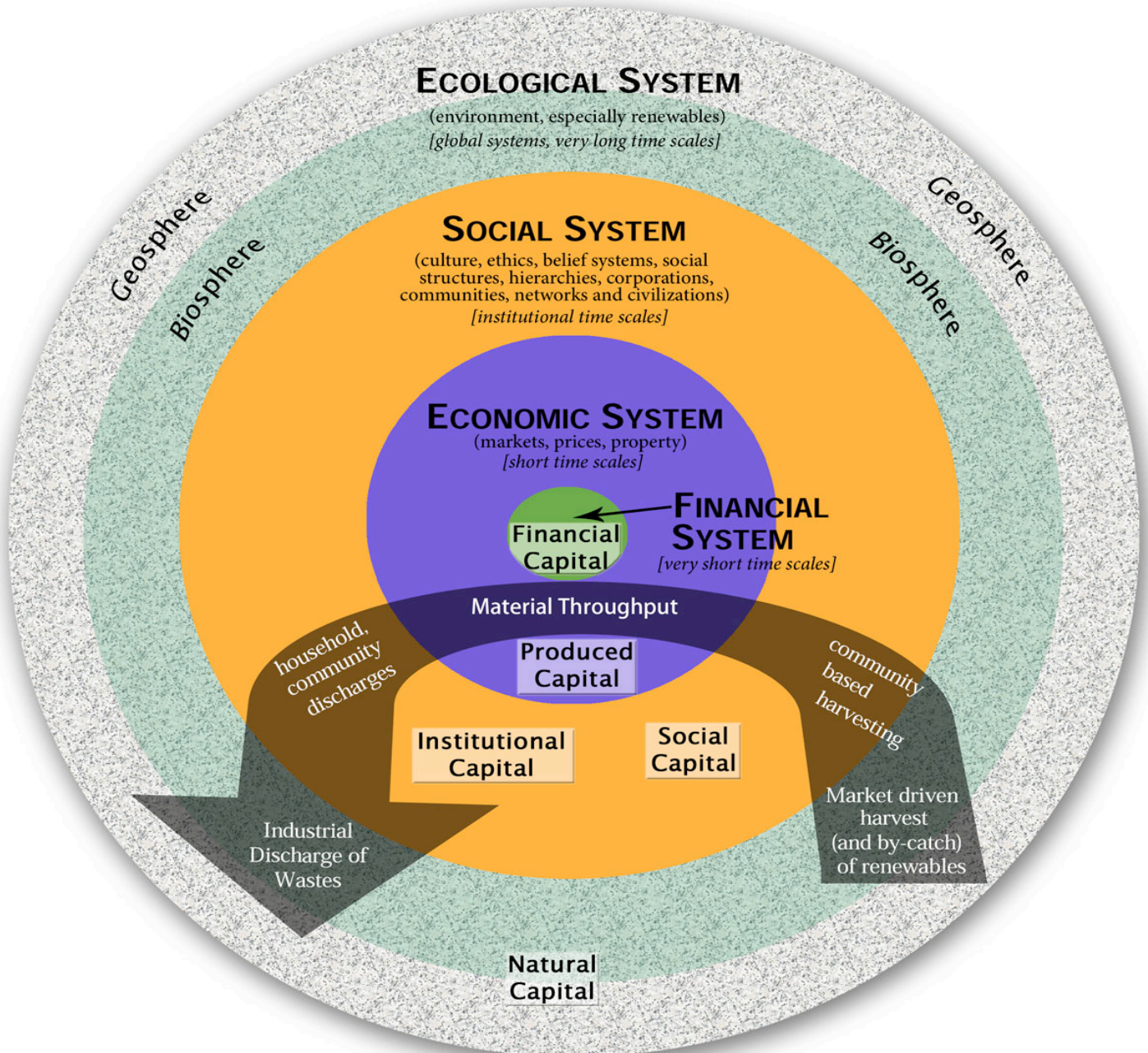
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[4] See also the brief explanations at http://www.worldtrans.org/essay/holarchies.html , Accessed December 9, 2007, and http://www.cast.uni-linz.ac.at/Department/Publications/Pubs1998/holons.doc , Accessed December 9, 2007)

evidence as to some of the adverse consequences flowing from the way in which we have chosen to exercise agency, and suggest strongly that the actions through which we intervene in the natural systems of that world seem clearly not to be in our long-term collective interest.

So let us try to push on to explore some of the context and determinants of those actions.

THE GLOBAL CONTEXT: EDGES, INTERFACES AND BORDERLANDS

Figure 1   ECOFRAME: Embedding in the Social-Ecological System (Dobell/Behr 2006; based on Dobell 1993)

Let's look for a moment first at the global context. Figure 1 is a diagram I developed a long time ago, and used for a small international symposium organized by Harold Coward (see Dobell, 1993), and I've used it ever since to argue for an essential figure-ground reversal, the change in perspective we need to deal adequately with environmental responsibilities and ecological stewardship in a market-driven world. The point is to see the economic system, based on financial and economic accounts, as nested within the broader social system. We created market institutions; they are one instrument by which to achieve social purposes. They ought not to be seen as controlling us; they are embedded within broader and more general social institutions. And all of that human system is embedded within the natural dynamics of the biosphere and the geosphere. The action that mostly concerns us here is at the margins of human settlement.

Of course the point of all this previous discussion is that the scale of human impact on those surrounding natural systems has become immense and is changing the whole. The big arrow signifies the flows by which humanity appropriates the resources and primary production of the Earth, and transforms it into waste discharged again into those natural 'life support' systems. And of course the return flow, the feedbacks by which those discharges return as environmental impacts on human society, completes the continuing cycle.

The shift in vision, the higher level of consciousness that Maathai seeks, has to be, at least in part, in seeing humanity as embedded in this way in Nature, not as Nature embedded in our economy simply as a resource pool for a human society that 'shall have dominion' over those systems. If we recall the extended publicity campaign to 'bring environmental concerns fully into economic decisions' we can argue that such an effort has the imagery backwards—that what has to be *seen* is economic decisions as one facet only of human activities fully embedded in the ecosphere. The model of 'free market environmentalism' is not a sufficiently comprehensive picture. Economic instruments and market mechanisms, though essential, are not enough to provide sufficient guidance to shape responsible human action within the biosphere. Social, cultural and ethical considerations drive the larger institutions and context within which our activities are set and our agency exercised.

These considerations lead us to look particularly at the forces shaping action at the edges, in the borderlands. We may consider as borderlands both the margins in which the formal market system interacts with formal political structures and informal social institutions, and also the margins of human interaction with natural systems—where human action presses on ecosystem function. Nancy Turner and colleagues (Turner et al 2003) suggest these cultural 'edges' may be as rich as the fruitful, biologically productive 'edges' between ecosystems. In an earlier note for a cross-border conference, Darcy Dobell follows Gloria Anzaldua's fruitful use of 'edge' as a verb evoking the tensions in the borderlands where distinct cultures and systems 'edge' each other, in order to explore some of the challenges of language in those borderlands (Dobell, 2002).

The borderlands in which formal economic organizations jostle or edge each other in relation to informal social networks and relationships is a particularly rich field for social science research these days.[5] Additionally, resource management is all about the margin at which the human impact on natural systems occurs and the response of Nature is felt[6].

Of course we should also note that both disciplinary 'edges' and cross-disciplinary work have proven to be most productive inside the academy when it comes to problem-oriented research. But even more fully integrated undertakings—I have in mind fully interactive research and broadly inclusive participatory processes—within the borderlands around the edges may be better still (at least for some purposes).

We need to examine both informal social interactions—the personal connections driving community governance—as well as structured relationships within formal institutions, and a possibly wide range of different modes of decision-making within each. All this begins to take us out of the natural sciences and into the social.

PERSPECTIVES FROM THE SOCIAL SCIENCES:
COLLECTIVE ACTION AND COOPERATION

What governs human activities at those edges, in those borderlands? What determines the decisions about how human activities will impinge on the surrounding ecosystems that are the source of ecological services and life support mechanisms? From a social science perspective, we focus more on institutions, norms, incentive structures, failures of cooperation than on trajectories of system components. Rather than looking at the components of this complex ecosystem in relation to each other, as part of a scientific analysis of the overall coupled social-ecological system system, we will need also to turn to the dynamics of the social system within itself.

To begin, it is useful for our purposes to distinguish components of that human subsystem. It is convenient to pull that human subsystem out by itself, as in Figure 2 below, and then within it to distinguish the state, the market, and the formal non-government sector from civil society more generally[7]. While the organizations of the state, the market and formal non-government organizations may be increasingly

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[5] The Clayoquot Alliance, which I'll mention briefly later, encompasses this theme in boundaries and borderlands, distinguishing boundaries that divide from borderlands in which interaction takes place. (http://www.clayoquotalliance.uvic.ca/research1.html) See also Brunet-Jailly, 2005, 2008.

[6] As in overfishing (Pauly et al, 1998; Worm et al, 2006) or the Global Program of Action to Protect the Oceans Against Land-Based Discharges (http://www.gpa.unep.org/). Or, in the other direction, one may wish to consider the impact on communities from anticipated climate change. (See for one example among many, the work of the Coasts Under Stress project, at http://www.coastsunderstress.ca/ .)

[7] Following the usage introduced by Jim Tully in a recent insightful address (Tully, 2008) I should really use the label 'civic society' rather than 'civil society' to distinguish the 'bottom-up' community-based democratic movement from the 'top-down' law-based, more hierarchical representative structure. For simplicity, I'll stick with the more conventional terminology here.

networked-based, they remain inherently hierarchical. They march to different organizational drums and imperatives.
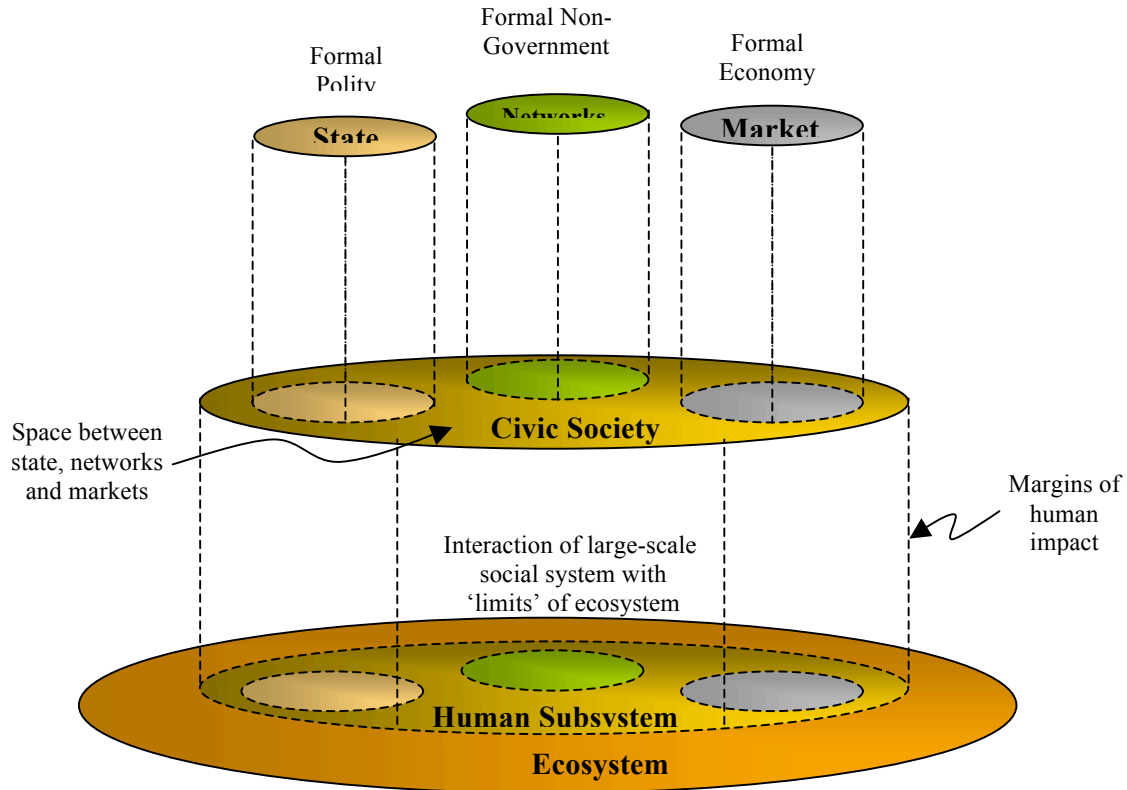

Figure 2
Institutions within the human sub-system

We need to distinguish the way decisions—including decisions on actions that intervene in, and increasingly dominate, ecosystem dynamics—are made within and among these different organizational forms. A wonderful body of new research in social sciences is helping us to understand why things seem to go so wrong, even when we think we know what would be the right thing to do.

To understand some of the dilemmas that arise, we need to move beyond these structures to look also at processes. For this purpose, I will briefly elaborate on what is widely used in policy sciences as a view of the policy cycle, or the way the process of forming collective decisions might be viewed. Note that I use the term 'viewed', rather than claiming anything about the way decisions in fact are 'made'. This diagram (Figure 3 below) does not imply that any orderly sequence is actually pursued in the development of public policy. Nonetheless, the diagram can be helpful in thinking about the various activities that go into arriving at collective decisions on social action (at any given scale—and indeed spiraling from one scale to another).

In overview, we can think of there being a general concern (depicted at around 9 o'clock in this diagram) with some social problem(s). A variety of social processes—participatory, consultative, authoritarian—may generate a policy agenda and lead eventually to agreement on articulating an intention to deal with the problem (the covenant, at 12 o'clock). A range of initiating activities within a variety of institutions is then necessary to elaborate the meaning and significance of these commitments. These activities may lead on to some consent (at 3 o'clock) to get on with action. And maybe, with a little coordination, some (individual) action happens (around 6oclock). And that action leads to consequences, which leads to further concern (because the action was misguided, or not enough, or not successful, or had unanticipated adverse consequences or all these and more), and so the process starts again—or rather, continues.
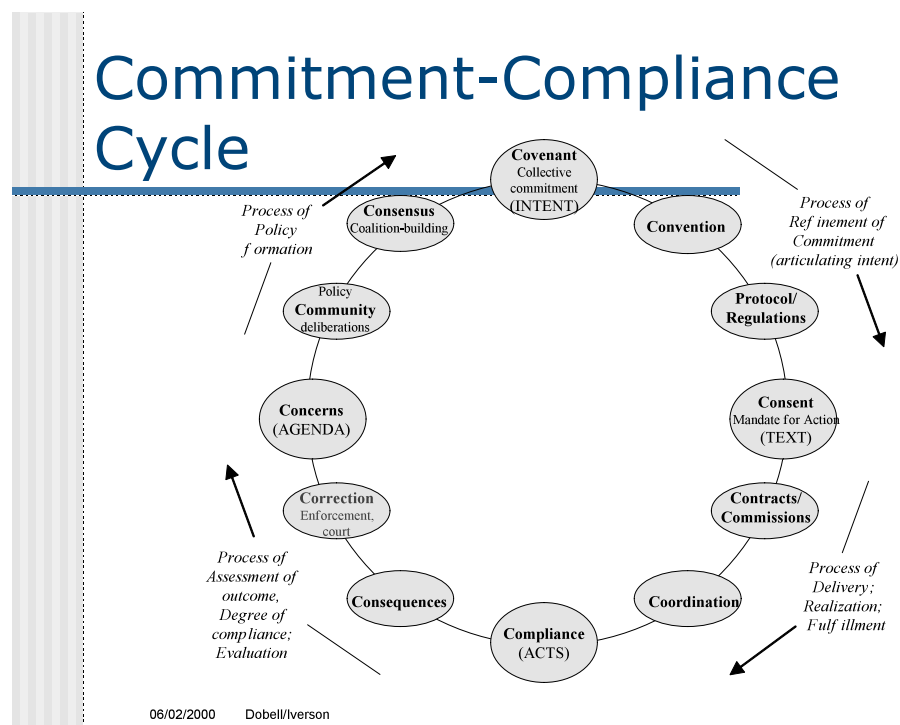
Commitment-Compliance Cycle

06/02/2000   Dobell/Iverson

Figure 3 . Dobell's Clock

In theory, this is the recipe by which problems would always be approached and solved in an orderly way—that is, 'rationally', establishing objectives and exploring means to achieve them. In fact, it is simply a checklist of activities likely to be encountered at some stage in social processes directed toward initiatives to achieve social outcomes through coordinated measures to bring about change in individual behaviour. And of course there is a wide-ranging literature suggesting that in fact this neat and intellectually orderly approach is not at all the practice actually pursued (see, for example, Lindblom, 1959; Pressman and Wildavsky, 1984). Moreover, much of this literature (e.g., Kahneman, Slovic and Tversky, 1982) is directed not simply at a description of ways in which actual decision processes and actions systematically differ from what would be prescribed by analysts, but also towards arguments that even at the individual level,

'rationality' is much more complex (Simon, 1982, 1996; Gigerenzer et al, 1999; Kahneman and Tversky, 2000; Engel, 2007).

One distinction we can usefully make as we move toward issues of public policy is to distinguish citizen involvement in policy formulation (governance, intention—the left side of the clock) from citizen engagement in policy delivery (interpretation, compliance, action, realization of intention—the right side of the clock). Thus, citizen agency refers both to our capacity to participate effectively in governance, and to our power to exercise our own discretion in achieving compliance. In particular, the flow of policy formation relates to thrashing out intentions and plans, and formulating goals and strategies, all of which ought to be authorized somehow. On the other hand, the flow from authorized general intention to specific instruction, or text, entails negotiating agreement, enlisting commitment, developing understanding and interpretation of intent, and teasing out compliance.[8]

In dealing with the social problems of resource management with which we began this discussion of trans-disciplinary research, the roles that decisions within formal market structures or formal government institutions may play, employing market mechanisms or explicit choice of other governing instruments, are well known and need not be pursued here. Even the involvement of formal civil society organizations has been extensively explored. What is of greater interest for present purposes is the civic space between all these formal institutions.

People interact differently in different institutional settings, with their different reward systems or incentive structures. One of the well-known problems of collective action recognizes that apparently rational individual agents acting in their own interest can be led to conduct that leaves everybody worse off, to outcomes that cannot plausibly be seen in any way as socially—or even individually—optimal or desirable. This is the problem by which, as people negotiate responses to problems on the social agenda or the public policy agenda, they are led to agree to abstract general formulations of commitments that sound very good and persuasive. But when they have worked their way down through all the steps in the process of agreeing upon action and implementing measures, and have arrived at the point of individual compliance, the incentives to cooperate are not there. Individually rational decisions—or at least decisions viewed as rational from the perspective of immediate self-interest—lead to socially irrational outcomes desired by nobody.

In managing needs for access to the resources of the ecosystem, the opportunities for free riders—people who can get the benefits of the general agreement without themselves

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[8] The notion of citizen agency and involvement is nicely illustrated in a slightly enriched version of an old joke about the preparation of a mythical ham and egg breakfast: the chef is involved; the hen is engaged; but the pig is committed. Here we have to think of the citizen as *involved* in policy formation; *engaged* in implementation; but *committed* to compliance, even when the outcomes (though accepted as legitimate), aren't necessarily good for that individual citizen, at least in the short run.

complying—are plentiful and tempting. (So, for example, the Convention on Biodiversity can be widely—though not universally—applauded, without having much impact on the discharge of waste into fish habitat or on the rate of extinction of species. Neither leadership nor social norms seem to play a role at this stage.)

We might characterize two features that interfere with appropriate exercise of citizen agency as the co-operator's dilemma and the performer's dilemma, respectively. (It must be emphasized, by the way, that the exercise of citizen agency should be seen as very different from the pursuit of consumer sovereignty or client satisfaction.) Figure 4 illustrates the first of these, the classic social dilemma.

The Co-operator's Dilemma

Collective Intention to pursue cooperative social interest

- Covenant / Collective commitment (INTENT)
- Consensus / Coalition-building
- Convention
- Policy / Community deliberations
- Protocol/ Regulations
- "Cooperator's Dilemma"
- Concerns (AGENDA)
- Consent / Mandate for Action (TEXT)
- Correction / Enforcement, court
- Contracts/ Commissions
- Consequences
- Coordination
- Compliance (ACTS)

Individual decision reflecting incentive to pursue immediate self-interest (to defect)
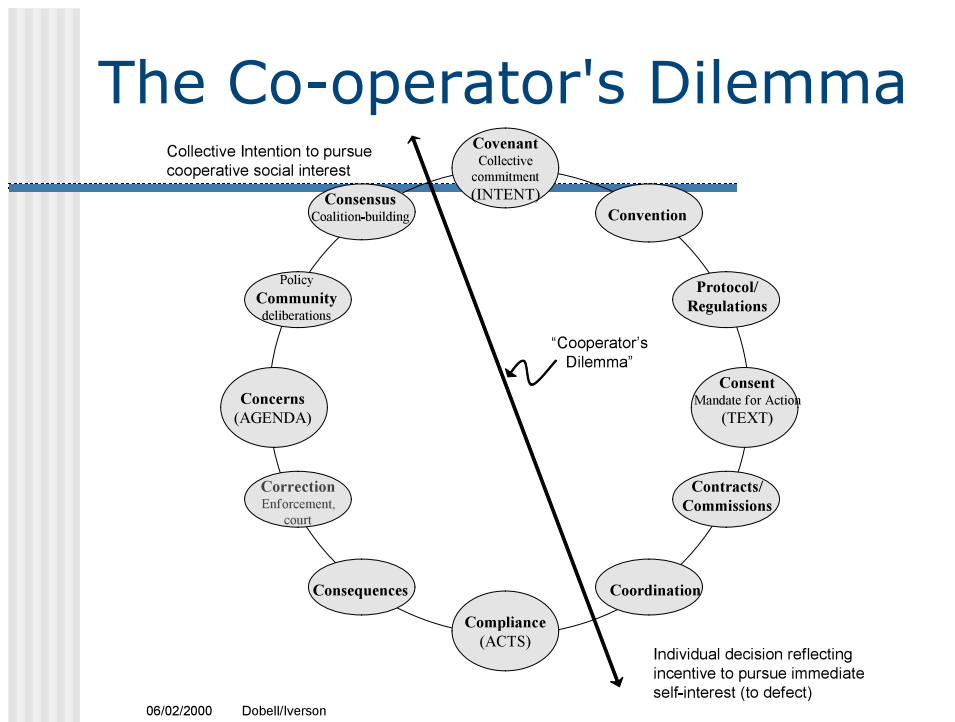
06/02/2000   Dobell/Iverson

Figure 4 Individually rational conduct defeats socially rational covenant

Kollock (1998) provides a good summary of the ways in which cooperation might emerge in response to such social dilemmas, in particular with respect to the problem of public goods (Kaul, et al, 1999) and the problems of commons dilemmas (Ostrom, 1990; Ostrom et al, 1994). As Kollock notes, in the case of public (non-excludable, non-rival) goods, the problem is that the existence of 'free riders' leads to inadequate production of a desired product or service, whereas in the case of commons problems, the challenge is one of overuse of non-excludable but rivalrous open-access resources. Solutions to these problems may emerge in a variety of ways, one of the obvious being to address the challenges arising from non-excludability. If boundaries can be established—barriers to access created—then the social dilemma may go away. But, as Gintis and Bowles (2005) emphasize, at the cost of introducing distinctions between 'insiders' and 'outsiders', forcing us to face the issue of 'them', 'us' and 'we' mentioned at the beginning of this survey, and to which we shall have to return at the end.

There is a fascinating flow of research moving beyond the methodological individualism of conventional economic theory and into broader notions of fairness, reciprocity, cooperation, community-based management, traditional institutions to govern access to adjacent resources, as in the references just mentioned above, or in much other technical work with computer simulation of competing strategies (Axelrod, 1984; 1997) for example, or game-theoretical explorations of the underlying structure, as described, for example, by Binmore (1998). (Flowing from empirical research in the emerging field of behavioural economics, there is growing interest in what Kollock labeled 'motivational' solutions to social dilemmas, based on social value orientations other than maximization of individual short-term self interest. Women, a lot of such research suggests, seem to be more comfortable with access based on notions of fairness rather than on human conduct as driven by the maximization of returns to self-interested individuals. Such broader notions of fairness and cooperation can, in some circumstances, successfully invade societies of defectors. Axelrod, for example, identifies the success of the so-called 'tit for tat' strategy in his simulation tournaments as flowing from the properties of being (initially) nice, but retaliatory, but forgiving—and always clear enough that opponents can discern the underlying strategy. On the other hand, as Binmore (op[. cit.) cautions very strongly, it is crucial to distinguish between the true proposition that evolutionary pressures can, in some circumstances, lead to selection of equilibrium strategies demonstrating nice behaviour that offers enduring success from the (possibly attractive but definitely incorrect) suggestion that 'nice' behaviour will always emerge as a successful outcome.)

Solutions to this cooperator's dilemma may come from altruism or from a more enlightened sense of long-term self-interest—or from a tightly intertwined mix of the two (Frank, 1988, Lichtenberg, 2008). Frank suggests that emotions—social value orientations—may emerge because these can be detected and can sustain pre-commitments and implicit communication essential to cooperation in the face of social dilemmas. More fundamentally, pathbreaking work by Gintis et al (2005) outlines the crucial role of social norms and pressures, focusing on the ways in which the forces of strong reciprocity and community governance can establish economic (and social) equilibrium.[9]

But, as they point out, much of this may come at the expense of divisive notions of 'insider' and 'outsider', surmounting the challenges of regulating access to adjacent resources only by introducing mechanisms to exclude those other than 'we'. This move then introduces many challenging questions, not just of equity and justice in a finite

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[9] As an example, if we take the idea of social capital as a social resource seriously, and recognize its importance in economic performance, we will not be so quick to agree that of course the financial capital invested in an enterprise should be compensated when new ecological concerns or environmental regulations cause the fish plant to close, while all the investment by people in building up skills and human capital as well as the support networks and trust relationships that keep the plant (and the community) operating effectively, represents a capital stock that has simply become useless, without any corporate or social obligation to consider compensation. So the presence of social capital is an important part of the interdisciplinary research agenda underlying resource management objectives, as we will note below.

world, but more specifically around diverse concepts of property rights (Hanna et al, 1996; Bunton, 2005).

Looking to the significance of all this in the context of the dynamics of the coupled social-ecological systems with which we began, there have been very interesting attempts to capture from the science some overall images of the process. One of the most influential images has been developed from the work of Buzz Holling and his colleagues, including many now grouped in the Resilience Alliance (www.resalliance.org). In his extensive writings on ecological dynamics, including the crucial element of 'surprise', now extended to include the dynamics of the human system, C.S. (Buzz) Holling has given the label *Panarchy* to the resulting complex of nested systems of institutional and ecological structures embedded in a process of constant , cyclical, evolution.

A somewhat different image, but still in the tradition of scientific imagination, emerged from earlier work on the noosphere or on the coupled social-ecological system that makes up our world, somewhat before this language was introduced. In his 1967 book, *The Ghost in the Machine*, as noted earlier, Arthur Koestler introduced the idea of nested systems of holons, and called the complex a *Holarchy*. Beyond the Holling models emphasizing ecological and institutional dynamics, we can look to the idea of Holarchy to capture another dimension of the structure.

Within these general frameworks, we might distinguish, roughly, two distinct stages of response to the challenge of sustainability as posed by the natural sciences, namely, dematerialization and resocialization (ref GBFP presentation, website). We can think of dematerialization as achieving reduced material throughput, or more generally achieving given social goals more effectively, through technological and institutional innovations, with given beliefs and values[10]. We might think of 'resocialization' as the evolution of beliefs and values, or the process of influencing beliefs and values, or, in other words, as a process of social learning (which may include internalization of external constraints leading to voluntary simplicity and reduced demand on the ecosystem, as described by Elias, 1978/82).

But beyond all this fascinating work on the structure of social decisions, and the evolution of their institutional settings, there is an even more basic problem. This arises when we place the problems of collective action discussed above in the richer context in which communication, memory, learning, and personal action in enforcement of social norms might arise. This problem is illustrated by what we might call the 'performer's dilemma', and to address it we have to look at the stories and myths through which social and cultural context is built.

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[10] This is the 'technological fix' beloved of the 'cornucopian school' that believes in the possibility of sustaining current lifestyles with reduced ecological impacts through the exercise of ingenuity and innovation. An extreme, somewhat tongue-in-cheek, example is offered by the always-provocative Cesare Marchetti, who suggested long ago the possibility that a technology-based decoupling of human activity from its natural surroundings could permit a sustainable population of one trillion people on Earth. (Marchetti, 1976).)

INTERPRETATIONS OFFERED BY THE HUMANITIES

As just noted, there is a dimension of perhaps even greater importance in relation to our questions about the ways we might achieve individual compliance to realize collective intent. Think about a composer, setting out in greater or less detail (but never of course completely because none of our vehicles for communication—explicit or tacit—can go that far) his or her intentions for a work to be performed by an orchestra. These intentions must be interpreted by a conductor, within the personal context he or she brings to this work in particular and within a personal stance with regard to the degree of allegiance owed to the text in general (Taruskin, 1995). The performance must be conducted with regard to its impact in the current setting, as well as with respect to the intent of the work in the context when it was written[11]. The performance must be carried out with the varying degrees of commitment and allegiance of all the performers, each with a degree of discretion to be exercised in personal performance. And the impact of the performance will be felt differently by individuals—performers and audience—bringing to it, and to the actions they are subsequently moved to take, all their own individual historical baggage and life experience, as well as their own individual sense of relevant social context and prevailing norms.
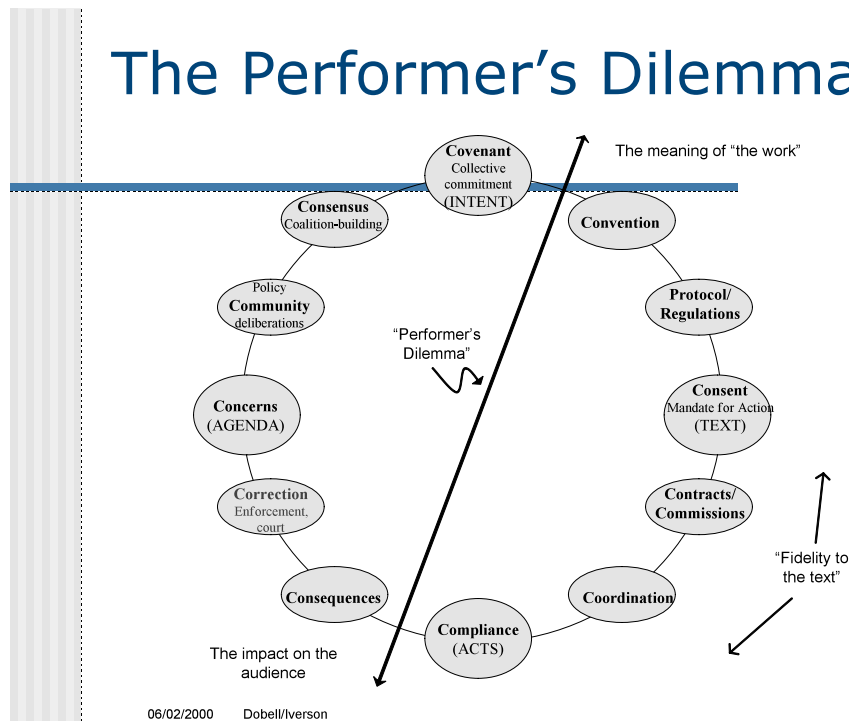

Figure 5. Text and Interpretation

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[11] The divided judgments of the Supreme Court of Canada in the Donald Marshall case offer a dramatic illustration of the resulting tensions. See the original judgment accessible at http://csc.lexum.umontreal.ca/en/1999/1999rcs3-456/1999rcs3-456.html .

Implementation failure, and the failure to tease out compliance with agreed covenants (sacred text) or formal mandates are tightly linked to this 'performer's dilemma'. Whether forest practices actually respect riparian reserves depends less on the text of legislation or formal agreements than on whether the heavy equipment operator has an appreciation of, and commitment to, and exercises his or her own discretion to realize the underlying intent of, complex text buried in codes of responsible practice (and perhaps not much at all on ostensible provisions for enforcement). Sustainability of local fish stocks hinges more on the attitudes of the kid on the after-deck of a heaving vessel, and the reward system he or she faces, than it does on the regulations drafted to establish a total allowable catch or control bycatch. More crucially, given the dominance of corporate decision-making in shaping the culture and reward systems in which all these individual decisions about harvest (or exploitation) practices are taken, everything hinges on the degree of allegiance of corporate or bureaucratic managers to the intent of the covenants and commitments they undertake. (Which of course is why there is so much apprehension about the way commitments to sustainable logging in Clayoquot Sound, for example, or to ecosystem-based management in the Central and North Coast regions, will actually be realized.)

So, to summarize the whole cycle briefly, we have an image of the process of public policy formation leading to an agreement, a commitment, an international convention or a decision of the cabinet or the chief in council or the deacons of the church. The meaning of that agreement has to be interpreted and negotiated among a wide range of individual agents involved at various stages, driven by their own perspectives and interests, deploying a range of resources that may promote or block the action envisaged by the original commitment. With the wide range of competing interests, contending perspectives and endless possibilities for slippage, how can we hope to get any 'effective' implementation of the original intent to undertake action proposed to deal with the original problem?

These questions take us much more into the particularities of place, into what Habermas has characterized as Lifeworld, of social interaction away from the domain of the formal institutional structures he labeled System

And, within Lifeworld, we have to look more deeply into the domain of individual values, and the processes by which shared values, shared commitments and cooperative practices might develop.

From where do shared values and common understanding of community context flow? Now we seem to be reaching well beyond the exclusive domain of social science research—though of course concerns for the institutions within which communication occurs are still central. There is far more to say than can be pursued here, but a recent essay by Ehrlich and Levin (2005) provides a start, and many references. (Interestingly, I tried without success to introduce some of these considerations into an OECD conference on human and social capital (Dobell, 2001); the idea that interactions between the dynamics of social capital and ecological capital, and the role of cultural evolution in the

overall complex system, formed an important dimension of social capital and human learning seemed to be regarded as uninteresting, if not silly. I remain persuaded of its importance, however.)

The question whether either the formal or informal institutions for deliberation and decision-making are regarded as legitimate is a crucial question both for social science and for cultural exploration. As just noted above, scrutiny of compliance and appraisal of conduct must consider both the intent of the work in the context when formulated and the impact of the interpretation in the context when realized. That is, realization rests on an adequate foundation of shared values and community context.

These concerns bring us firmly into the realm of communicative action and concerns with fair or ideal speech situations. They bring us toward discourse theory, and the foundations for multi-party interaction and deliberation (Habermas, op cit) Donald Schon and Martin Rein (1994) provide an insightful summary of work since the early 1970s on the way in which the mental frames or mental models we bring into social interaction might be reshaped by that interaction.[12]

 If we are going to get into the realm of values, norms, beliefs, preferences and the processes that form all these both for individuals and shared within communities, we must recognize another layer to the earlier diagram of the components of the system. There is another realm—one hesitates to call it spiritual—but it is the realm in which the mind may be distinguished from the brain. This is, presumably, the place where the exercise of agency is shaped. Both beliefs and values are your own, but may be subjected to elements of reality testing. Beliefs may be required to confront empirical evidence, subjected to varying degrees of testing and possibly refutation through observation. Values, on the other hand, may be subjected to tests of evolutionary fitness, with a search for evolutionarily stable strategies, as laid out in the growing literature cited earlier on the evolution of cooperation, the evolution of social contracts, the study of cellular automata in simulation of the role of trust, reciprocity or reputation in social relationships and similar emerging topics.

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[12] Tully says that "[c]onstitutional negotiations are…intercultural dialogues where the post-imperialist majesty of *audi alteram partem* always has her final say….Constitutions are…chains of continual intercultural negotiations in accord with…conventions of mutual recognition, continuity and consent" (Tully, 1995, p.183). See also Kahane at the web address noted in the bibliography.

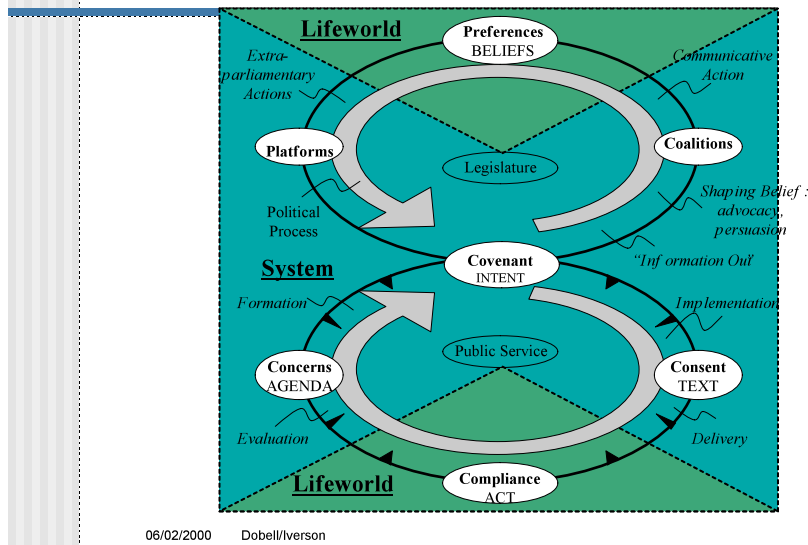# Citizen Agency Through Social Coordination

06/02/2000   Dobell/Iverson

Figure 6. Beliefs and values shaped in Lifeworld: the evolution of norms

Here we have taken the earlier commitment-compliance cycle and added to it a segment designed to represent the process by which reflection on the experience of formulating policy to deal with social challenges (and all the observations and experience emerging from that process) may lead to revision of the beliefs and values that went into the earlier interactions. This leads us to confront a monumental dilemma—how can collective decisions be made in the face of disagreement on the nature of reality, and conflicts in the force of distinct values? How can we deal with differing understandings of the facts, as well as contradictory theories and models of the world and conflicting ethical frameworks?

Social Studies of Science, Science and Technology Studies all suggest that our 'facts' are socially construed (Douglas, 1995) and even that our values are up for grabs, to be amended as we come to grips with what they mean in the face of the constraints they place on our freedom of action. What are we to do when the foundations of fact and evidence and sound science on which we are supposed to rely seem to shake beneath our work?

Two books by Harvard philosopher Hilary Putnam (1987, 2002) offered me help on this vexed question. Putnam finds that

> "[w]hat we cannot say—because it makes no sense—is what the facts are independent of all conceptual choices.). ...   "That we cannot separate our own conceptual contribution from what is objectively there is not a disaster." (Putnam, 1987).

He notes later that

> *"As John Dewey urged long ago, the objectivity that ethical claims require is…the ability to withstand the sort of criticism that arises in the problematic situations that we actually encounter" (Putnam, 2002.*

Even more fundamentally, we must learn to deal with the contradictions, or what appear to be contradictions—to address what was, and was not; what happened and did not. Jan Zwicky, in her wonderful book *Wisdom and Metaphor* (Zwicky, 2003), quotes Herakleitos: "We step and do not step into the same stream; we encounter what is and what is not." Or, more scientifically, "Clarity does not reside in reduction to a single directly comprehensible model, but in the exhaustive overlay of different descriptions that incorporate apparently contradictory notions." (Holton, 1988, p. 102). Sagoff (2007) picks up the question in relation to conflicting images of environmental valuation.

Ted Chamberlin's book, *If This is Your Land, Where are Your Stories?* (2004) focuses on the ability to comprehend these contradictions as a necessary condition in coming to grips with the meaning of First Nations accounts. The issue becomes that of finding what these stories mean for our understanding of the complex socio-ecological systems in which we are embedded.

But these contradictions need not be so devastating for our ambitions to be rigorous and rational as is often claimed. Holton (1973) traces the roots of the principle of complementarity enunciated by the eminent physicist Niels Bohr, in which contradictions of the sort mentioned above need not be seen as uncomfortable, but rather essential to a full understanding of physical phenomena, or life more generally.

> *Bohr's proposal of 1927 was… we should attempt not to reconcile the dichotomies [of classical physics and continuity on the one hand, and quantum physics and discontinuity on the other] but rather to realize the complementarity of the representation of events in these two quite different languages. The separateness of the accounts is merely a token of the fact that, in the normal language available to us … it is possible to express the wholeness of nature only through a complementary mode of descriptions.*

According to Holton,

> *The full grandeur of Bohr's ambition was to apply the complementarity point of view also to the understanding and toleration of differences between traditional cultural systems. What gave it all such urgency for him was of course his perception that the most time-honoured method of conflict between societies was chiefly the attempt by one to annihilate the other, and that in the atomic age this method had become a guarantee for universal catastrophe, for mutual suicide. As Bohr put it, the main obstacle to a peaceful relation between various human societies is 'the deep-rooted differences of the traditional backgrounds…which exclude any simple accommodation between such cultures. It is above all in this connection that the viewpoint of complementarity offers itself as a means of coping with the situation'. (Holton, 1988, p. 466)*

But in addition, in different imagery, from the more traditional side of knowledge transfer, we have the stories of entities that are tricksters, but much more than tricksters. These are the entities whose stories are to unlock the mysteries of creation and life. As work in resource management seeks increasingly to integrate traditional knowledge with conventional science, we see greater attention to these images.

These traditions are not limited to the indigenous or aboriginal. Much work on community-based resource management is taking into account the importance of traditional community structures, indigenous or otherwise. Many accounts of traditional methods of enforcement of perceived rights to adjacent resources call forth admiration for the effectiveness of informal social pressures in promoting conservation and sustainability of resource base and community.

These accounts also raise some very serious concerns about how such institutional norms and structures can be meshed with representative government and parliamentary processes. I can't resist quoting a long excerpt from the conclusions of the Ostrom et al (1994) study of institutions for governance in common pool resources (CPR) settings.

> *Our analysis of successful self-organized CPR institutions makes us optimistic about human capacities to overcome the "social dilemmas" they face. It also makes us pessimistic about the likelihood of self-organized improvements in three types of settings. The first is where individuals have no expectation of mutual trust and no means of building trust through communication and continued interaction. The second is where mistrust is already rampant, and communications and continued interactions do not reduce the level of distrust. The third is where many, but not all, individuals are willing to extend reciprocity to others but lack authority to create their own self-governing institutions. Without the capacity to create rules and establish the means of monitoring and sanctioning these rules, reciprocity alone is frequently insufficient to cope with individuals who succumb to the temptation to cheat. If those who are preyed upon cannot develop sanctions against their predators, the likelihood of achieving higher outcomes through their own efforts is low.*

How, in other words, might we bring together what Tully distinguishes as civic society by contrast to civil society (Tully, 2008)?

We might, in fact, turn to Trickster, the boundary-crosser. Just as Panarchy and Holarchy offer us images to deal with both the natural science and the social science aspects of the complex social-ecological systems we inhabit, so also do Raven and Coyote, among the best-known of Tricksters. The literature on these fellows is vast; we can sample just a few comments to make our point.

Thomas Hyde, in *Trickster Makes This World* (Hyde, 1998), makes the main points for us.

> *Trickster is a boundary-crosser. Every group has its edge, its sense of in and out, and trickster is always there, at the gates of the city and the gates of life, making sure there is commerce. …there are also cases where trickster **creates** a boundary…boundary*

creating and boundary crossing are related to one another, and the best way to describe trickster is to say simply that the boundary is where he will be found…the god of the threshold in all its forms. (Hyde, 1998, p.7).

But for our purposes there is another crucial feature of Raven and Coyote.

The Trickster, icon of unexpected change, not only demonstrates the universality of uncertainty in the human world, perceived or not, but also the unpredictability and sheer unlikelihood—to humans in our blinkered minds—of the nature of things. …The trickster thus holds an awareness of the radical uncertainty in which we all live….he is the opposite of order…he can change shapes, cross boundaries…change the expected world, and therefore be an agent of transformation. (Hardy, 2005; p. 4).

So Raven and Coyote do not offer us just a god of the threshold, but a god of transdisciplinary research, a boundary crosser and a dealer in surprise, comfortable with chaos. "Trickster keeps the wall between social order and chaos permeable. Chaos, then, remains accessible to human beings; in addition to being a thing of terror, chaos also becomes a treasure trove of possibility to be accessed when need be." (Gross, 2005) The creations of the imagination that physicists call string theory, or the mathematical explorations of resilient societies organized 'on the edge of chaos', are hardly different in spirit from other stories and creation myths (though perhaps judged by different criteria and more stringent expectations of internal—mathematical—consistency).

The point I am trying to emphasize here is that the attempt to pursue participatory community-based research exploiting local and traditional knowledge, and other ways of knowing or seeing, or other ways of believing or belonging, is not a second-class activity inferior to 'sound science'. Coming back to Gerald Holton and Niels Bohr, Holton quotes Bohr as saying

The aim of our argumentation is to emphasize that all experience, whether in science, philosophy or art, which may be helpful to mankind, must be capable of being communicated by human means of expression.

And he cites Karl Popper as characterizing the status of science in these words.

I think that we shall have to get accustomed to the idea that we must not look upon science as a 'body of knowledge' but rather as a system of guesses or anticipations which in principle cannot be justified, but with which we work as long as they stand up to tests, and of which we are never justified in saying that we know they are 'true' or 'more or less certain' or even 'probable'.

Holton goes on to say "**Our justification for these hypotheses is that they have a hold on our imagination and that they help us deal with our experience**" (Holton, 1988, p. 20)

The more one studies resource management issues, the more the questions seem to come down to images of relationships, beliefs about rights—property rights, access rights, management rights, rights to participate, to speak, to be heard, to have influence.

Essentially, this involves perceptions of rights of some to exclude others. How are 'we' to do so—and justify doing so?

Rights of access to adjacent resources are seen in many ways. Questions of community governance and formal property rights—rights to Nature—have many dimensions, both in looking at the norms and practices in the traditions of First Nations and in tales of more recent community traditions.

Consider, for example, this description of traditions in Newfoundland fisheries:
And though the prices are higher and the competition tighter, the grounds to which the Jenny Lynn once went remain untouched and unfished as they have for the last ten years. ...Twice the big boats have come from forty and fifty miles, lured by the promise of the grounds, and strewn the bottom with their traps, and twice they have returned to find their buoys cut adrift and their gear lost and destroyed. Twice the Fisheries Officer and the Mounted Police have come and asked many long and involved questions, and twice they have received no answers from the men leaning in the doors of their shanties and the women standing at their windows with their children in their arms. Twice they have gone away saying: 'There are no legal boundaries in the Marine area'; 'No one can own the sea'; 'Those grounds don't wait for anyone.'
But the men and the women, with my mother dark among them, do not care for what they say, for to them the grounds are sacred and they think they wait for me.
The Boat (excerpt) Alistair McLeod, 1968

One reason that the complex systems we study may display low controllability is that we lack any consensus about how we ought to regulate human access to resources or ecological services. In many settings, the issue of property rights—rights to nature or natural systems—has not been resolved. A second reason may be that we have not achieved, across the many cultural gulfs, any genuinely shared understandings of more general ecological rights or of our obligations to others.   As noted earlier, "The challenge is to work with a permanent argumentation between the two—or more—contradictory positions." (O'Connor, 2002, p. 191) This sounds much like ideas of agonistic democracy (Mouffe, 2005), which in turn capture and extend the conclusions of Calabrese and Bobbit in their work on administrative dilemmas they cast as 'tragic choices'.   It also echoes earlier comments here about the inevitability of continuing deliberation around propositions not open to definitive resolution as objective facts.

A little change in language that seems not to have been much noted illustrates the centrality of contestable ethical judgments around duties to others, whether distant in time or in place. In the 2005 Millennium Ecosystem Assessment report **Ecosystems and Human Wellbeing** the idea of sustainability is characterized as a situation in which "the needs of the present and local population can be met without compromising the ability of future generations **or populations in other locations** to meet their own needs (emphasis added)". (MEA, 2005, p.378) This little wording change in our characterization of sustainability seems to have rather substantial implications for how we ought to see the needs of others. The basis on which one community might justify the exclusion of others from access to the natural capital and ecological services that might be seen as a common

heritage of humankind needs some fundamental consideration as we explore institutional innovation at community scale, as well as at global scale. How we might imagine living together as communities of many scales, in the face of increasing constraints and permanently unresolvable conflicting claims at global scale may be another dimension to the researchable question identified above. The research program pursued by Mathias Risse (see Risse 2007) explores the nature of human rights arising from common ownership of the Earth, for example; the extent to which such rights include rights of in-migration to otherwise sustainable communities, in order to exploit access to adjacent community resources, might be an important topic for further research. (Of course we have already seen the extent to which the argument for equal ecological rights leads quickly to politically unacceptable (at least for now) policy conclusions about the nature of resource transfers that wealthy nations—or rather, wealthy people—should undertake in the attempt to meet the challenges of global climate change in any post-Kyoto architecture. See Baer et al, 2007, especially pp 47-57.)

So perhaps we can turn to community-based research, participatory action research, participatory integrated assessment, and similar undertakings with some confidence about both the importance of the work, and the integrity of the approach, and with a sense of the seamless web that stretches from underlying observations on the reality 'out there' through the processes of interpretation, deliberation and negotiation that lead to the formulation of collective intention, the realization of that intention, and the attempts to imbue all with meaning.

CONCLUSION

Can we really have interdisciplinary research? If we're talking about the kind of questions I opened with, there is no other way. Such research is possible, but it is not easy. It still does not fit easily within the institutional setting of universities, or the reward systems of academic life.

So, to begin to draw some conclusions in order to answer the questions I was tasked to address, let me suggest that interdisciplinary (or trans-disciplinary) research is essential to deal with the sorts of questions I suggested might occupy the Institute for Coastal Studies. Nonetheless, there remain serious challenges in attempting to develop criteria for quality in such work, to know what is good work. There are few standards assessing academic rigour or research excellence in such fields. The conventional methods for assessing work or people in specific disciplines do not carry over much at all to interdisciplinary work. (Mansilla et al, 2003) Such work can always be viewed—and not always unfairly—as an attempt to escape from the demands of rigourous scholarship. One consequence is that granting agencies are challenged to deal with requests for support of such work. The adjudication processes in competitions for grants often appear remarkably random and unable to come to grips with the realities of particular research in particular places. (SSHRC, it seems to me, has particularly serious deficiencies in this respect, when it comes to appraisal of proposals for transdisciplinary work intended to have serious relevance for practical applied policy.)

Can we have community-based management that is seen as legitimate in science-based policy formulation as well as in the field? Community-based management is not a matter of simply flowing knowledge more readily to communities; not a matter simply of better dissemination or better targeting of research results. It is a challenge to achieve fully interactive synthesis of sources of knowledge, in order to develop research that responds to community priorities. Again, there are no criteria to identify good work in community-based research, no standards for replicability, independent of the personal convictions of the researchers or others involved. Given the dynamics of community life, it becomes hard to know when one is violating the fundamental dictum 'do no harm'. Again, neither academic institutions nor granting agencies are well set up to handle judgments about quality. For the research institution itself, there come along big challenges of finding the dividing line between research, participatory research, participatory action research, advocacy, and outright social action or activism based more on conviction than on any solid evidentiary base.

Pitfalls of CBM include an impatience for results. There is a time-consuming need to negotiate clear ('evergreen') understandings on protocols for research, control of intellectual property. It is a vital, but lengthy process that may end up bogging down the initiative entirely. Another issue is that of vulnerable funding, which creates risks of 'entrapment'. Having launched a front-end funded program, community-based researchers may find that they have led community members into a process that

drastically constrains the freedom of action and agency of community members who have been drawn into the activity.

Community-based management also suffers from the nature of central review processes, particularly their failure to recognize the crucial particularities of place. (See Scott,1998.) Above all, when it comes to the adequacy of solutions to the problems we pose, the big pitfall seems to be the temptation of the researcher to see solutions through devolution, delegation, subsidiarity—solutions that look good in theory but are unlikely to happen. It is the failures in attempts at power-sharing (and even information sharing as a feature of that) that condemn much of our trans-disciplinary work in ecosystem-based management to irrelevance at best.

With this focus, and these cautionary notes, we might still see three key components working together effectively in the future directions of community-based research or community-university research alliances, or simply interactive research and policy formation more generally:
-Academic research: identifying, in social context, more focused social concerns (values and belief systems; learning; institutional evolution)
-Community: moving from act to consequence (natural system); grounded theory; community-based monitoring[13]
-Borderlands: moving from covenant to text, from intention to action, through social/institutional systems, across cultures.

It is important to emphasize that all of this work faces real, inescapable constraints in a finite world in which not all aspirations, or even all needs, can be satisfied. The fundamental conclusion from everything I have said here is that the challenge to us all in work on community-based resource management or integrated management or ecosystem-based management or adaptive co-management or sustainable development is not to find ways to 'win-win' solutions or 'win-win-win' solutions. It is to find norms and procedures and deliberative forums and participatory mechanisms and cultural understandings strong enough that we can live together even when the constraints of the ecosystem do not permit us all to achieve what we want. It is to find social structures viewed as so credible and so legitimate that their decisions will be accepted even by those for whom the outcomes are adverse, at least on the first round. We need to find social structures in which even those who lose initially will maintain their faith that they win in the long run when the decisions command the allegiance of all, and tease out compliance from all.

So to come back to the question with which I began-- the nature of interdisciplinary research, and the role of community participation within it, and the question whether interdisciplinary research can help to resolve complex resource management issues on the BC Coast—I have to conclude that sustained community participation and deliberation

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[13] An important future priority for both academic and community participants will surely be the development of capacity for computer-assisted participatory integrated management, and particularly the rapidly evolving capacity for computer-based visualization of land and resource use scenarios, giving literal foundation to our capacity to see the world in which we live and must make decisions.

within a continuing trans-disciplinary context is crucial. It is essential in achieving the necessary synthesis of perspectives and beliefs to support effective action in management of human activities with ecological consequences—the very core of resource management responsibilities.

Chamberlin asks whether one place can be home to more than one culture[14]. He answers his own question by suggesting that it may be possible, if we can learn to re-imagine the notion of 'them' and 'us'.

I want to pose for you the larger question: *Can our Earth—our one small blue planet—be home to all people, grouped into their many overlapping cultures? Can we find ways to live together, with our many contradictory stories of what was and was not, in a world without 'win-win-win' solutions?*

Again I'd like to argue that the answer to this question can be 'yes', but again I'd have to argue that it is possible only if we can learn to re-imagine notions of 'them' and 'us'. We have to be able somehow to come to live together in a full world (Daly) with all our very contradictory stories of what was and was not, what is and is not, what justifies my claims as against yours.

In the mid-1980s, I wrote a little note for Delta, the magazine published at the time by the Canadian Global Change Program sponsored by the Royal Society of Canada, titled "Gaia's Cancer". That title was the object of some criticism, for reasons that are still not clear to me. The simple idea of this note was that the scale and pace of population growth, and the pace and scale of adoption of ever-larger, unselective destructive technologies for harvesting and resource exploitation constituted an out-of-control cancerous growth in the ecosystem. Population growth world-wide is now said to be stabilizing (though it still has a long way to grow before leveling out). But the appetite for rising material standards can only increase dramatically with the growing population. And the scale and destructiveness of technologies with catastrophic impacts on the ecosystem, and the timid nature of our attempts to require more selective technologies, and the distorted pricing systems that continue to make these technologies profitable and apparently "efficient", all suggest that the image of cancerous growth is still appropriate. And much of industrial activity or economic policy is 'efficient' in the way that a cancer cell is 'efficient', achieving maximum growth but without regard for the validity of the metrics by which accomplishment is measured. When our price systems fail to signal any concern for the value of natural or social or cultural capital (or even human capital aside from its rental value in labour markets), we can legitimately be concerned that our measures have little to do with human wellbeing or the health of our planet.[15]

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[14] The principal protagonist in Ann Patchett's novel *Bel Canto* asks similarly whether it is possible to love someone with whom you cannot speak; she answers her question in the affirmative, but that answer hinges on the universal power of music as a shared love.

[15] Even in the now widely-acknowledged case of the failure to incorporate in prices or economic decisions the recognized spillover costs imposed by carbon emissions, output and productivity measures continue to be churned out as capturing ostensibly the wisdom of the market with respect to the highest and best use of natural resources.

James Lovelock, the father of the notion of Gaia, seems now to have concluded that this process (in particular in its climate warming manifestation) has gone past the point of no return (Lovelock, 2006).

Which leads me to this closing question, namely *How ought we, as people, to live? Or How ought we, as species, to die?*

We have, it seems to return to the challenge posed by Matthai in her Nobel Peace Prize acceptance speech: it is up to us, and we must embrace the challenge of finding a path to the new level of consciousness, a new level of awareness and acceptance of our personal responsibility for the full consequences of our own actions in a global context.

And so we come back, not surprisingly, perhaps, to the age-old questions around what it means to live a good life, to pursue virtue, and old challenges around the moral guidelines that shape our duty to others, should shape our conduct. As Paquet, addressing a somewhat different set of issues, suggests, we have to recognize complexity where it exists, instead of denying it, and we have to face a "reframing of our approach to social phenomena that take into account the basic tensions with which humanity must live." (Paquet, p.68)

There surely is, in this brief account, more than enough challenge for researchers exploring particular features of the specific dynamics of coastal ecosystems in particular places—but doing so in the overall context of the universal challenges confronting the exercise of human agency driven by accumulated beliefs in the face of profound uncertainty, recognizing, as Rushdie notes in the epigram heading this monograph, that not only do we "see" out there what we expect to see[16], but also that the world we see— our imagery—has real and profound consequences for "the world out there"—our only home.

I can only wish you the best of luck in meeting this challenge within the new Institute for Coastal Research.   Malaspina College achieved an exemplary record in opening to members of the community much greater access to post-secondary experience than they could otherwise have had. It will be good to see ICR extending a tradition of participatory community-based research in which the particularities of place are recognized and cherished rather than being ironed out in the homogeneous abstractions demanded by a state or the "immutable mobiles" (Jasanoff, 2005) of abstract science.

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[16] In a fascinating recent example of science pursuing the artist's insight, Hedden et al (2008) report direct evidence of cultural modulation of brain responses, but suggest that it is not so much that individuals in different cultural contexts literally see the world in different ways as it is that cultural influences on brain functions result in increased needs for sustained mental attention during tasks requiring judgments or processing styles for which individuals are less culturally prepared.

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