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Stream: Systems Thinking and the Environment

Dissent, Conflict, Enquiry: Is Environmentalism Science Communication?

Abstract:

Environmentalists often present science-based arguments that are designed to persuade the public toward a belief that can be used to inform future action. Can environmentalism therefore be thought of as a form of scientific communication? In this paper I shall argue that it can. Drawing on the semiotic logic of Charles S. Peirce, I show how feelings of concern for the environment are transformed into demonstrations of concern, which are, in turn, transformed into systems that guide action. I call these phases 'three grades of concern'. I link them to Peirce's semiotic categories to show how three distinct styles of environmental argument can be identified: whistle-blowing (the category of feeling); demonstrating (the category of reaction); and enquiry (the category of human-nature mediation). These three grades of environmental rhetoric are then applied to a case study in which I examine an evolution of concern about rainforest destruction by unsustainable logging. In the case study I show how the feelings of concern for the environment of the Penan people of Sarawak's rainforest became the subject matter of demonstrations in Australia, and how, in turn, the rainforest concern demonstrated in Australia became the focus of a research publication called the *Good Wood Guide*. My paper's aim, then, is to show how environmentalism can be viewed as a form of opposition to established knowledge, but not necessarily to scientific method. Science, in its search for truth, continually challenges the *status quo* in order to create new ideas. In this respect, I argue that scientists and environmentalists share a common methodology.

Introduction[1]:

Can environmentalism be viewed as a form of scientific communication? The question implies an assertion that it can. In this paper I develop a systems view of the question and argue that environmentalism is a practical form of scientific enquiry. To show how I came to this conclusion, I will give a short account of what it is that *semiotic logic* is, its historical development, some key terms, and then apply the framework of understanding to a case-study to demonstrate my central claim.

Semiotic, as I use the term here, is a general theory of representation and interpretation developed by Charles Sanders Peirce (1839-1914). Peirce has rarely been linked to systems thinking[2], however, in my view Peirce's semiotic should be regarded as a systematic examination of all that is implicit in the idea of a system (i.e., system considered as a noun). For Peirce, a system is a sign, and a sign is, "…something which is capable of revealing something experientially -- that is, as a phenomenon, fictional or real -- to a being capable of responding to it (the sign) appropriately" (Ransdell, 1994). In what follows, I shall argue that the word 'system' can be substituted in the above definition without creating a contradiction.

Bertalanffy defined systems as "sets of elements standing in interrelations" (1968, p. 38). Interrelations, in turn, are defined as elements that stand in relation, so that if one element in a set is different in its behaviour from the same element in its relation with another set, an "interaction" is detected (p. 56). This definition, when generalised, became "General System Theory" (GST), an idea Bertalanffy first presented in 1937 to a philosophy seminar convened by Charles Morris at the University of Chicago.

Morris acknowledged an intellectual debt to Peirce (cf. Sullivan, 1988). The influence of Peirce's semiotic on Morris's work, especially his three-fold division among syntactics, semantics and pragmatics, has in turn been influential in communication theory to the

[1] Wherever possible, references in this paper are made to Peirce's writings by volume and paragraph number in the *Collected Papers of Charles Peirce* (1931-58). References of the type MS refer to Peirce's microfilmed manuscripts, as listed in Richard Robin's *Annoted Catalogue of the Papers of Charles S. Peirce* (1967). References of the type SS refer to the page number in *Semiotics and Significs (1977).*

[2] Although the systems concept has occasionally been discussed in Peirce scholarship (e.g, Boler 1963; Tursman 1987), I have been able to locate only one doctorial dissertation and one journal article derived from this that is explicitly devoted to an examination of C. S. Peirce and systems theory (Herbenick 1970).

present day. Indeed, each of Morris's divisions has evolved into a research discipline in its own right.

Bertalanffy's personal contact with Morris, indeed, their shared interest in signs (e.g., Bertalanffy 1965, Davidson 1983) does not appear to have resulted in Bertalanffy having any familiarity with Peirce's conception of semiotic, nor its potential relevance to the concerns of GST.

The above oversight may partly explain why Peirce's work has continued to be largely overlooked by researchers and educators of systems thinking. Sullivan (1988; 1991), however, has identified a perhaps more important reason for the early disconnection. Sullivan argues that there are important differences between Peirce and Morris, the former enunciating a "realist" theory of communication, the latter developing a "nominalistic" or anti- realist position (cf. Sullivan 1988, especially Chapter 3). Indeed, Sullivan (1988, pp. 178-79) argues that Morris's well-known reading of Peirce has led communication scholars to be concerned primarily with the *socio-psychological* effects of communication rather than the *logical* effects of signs.

Sullivan traces the roots of the Morris/Peirce divide to the Port-Royal treatment of rhetoric. This early framework became assimilated into the method and metaphysics of Descartes (cf. Sullivan, 1988, p. 41 ff.). As is well-known, the Cartesian method takes as its starting point an epistemolically privileged cognition. It therefore eradicates a role for invention -- the discovery of arguments. Indeed, invention was considered by Cartesians to be something that only confused reasoning and therefore it should not provide a starting point for thought. Peirce, however, notes that:

> The feeling which gives rise to any method of fixing belief is a dissatisfaction of two repugnant propositions. But here already is a vague concession that there is some *one* thing to which a proposition should conform. Nobody, therefore, can really doubt that there are realities, or, if he did, doubt would not be a source of dissatisfaction. (CP 3.254, original emphasis)

As Kevelson (1984) has also noted, one of the results of holding to a purely analytic view of enquiry is that the method of science can be viewed as something entirely split-off from the domain of rhetoric, primarily because rhetoric is considered to introduce a fundamental disconnection from the real world.

Another of the outcomes from adhering to the above faulty disconnection has been that the communication of science (as distinct from the doing of science) is often thought to involve value-judgements, therefore communicating science is often seen to be a task that should be left to socio-psychological manipulation. The work of communicating scientific ideas is consequently often allocated to experts in public relations these days. Under the influence of a recently introduced split between logic and rhetoric, scientific logic is understood to be the domain of science while rhetoric loses its epistemological foundation.

As is the common experience of environmentalists, without this vital linkage between logic and rhetoric, the communication of environmental concern by rhetorical means is easily trivialised because it is deemed to be based in "emotion" rather than "fact" (cf. on this issue especially Latour, 2004).

One of the chief accomplishments of Peirce's semiotic logic, then, is to re-establish the epistemological function of invention, and therefore to also re-establish a scientific role for rhetoric. Peirce achieves this, I shall argue in more detail shortly, by including in his conception of all that is necessary to a sign (or system), a mode of inference that is ontologically and epistemologically ampliative (i.e., an *abductive* form of inference). This is why, in arguing the case for an expanded systems-understanding for environmentalists' rhetoric, I argue it is appropriate to draw on Peirce's integrated semiotic logic. Using Peirce's semiotic, rhetorical invention can be thought of as a vital part of any method through which new ideas are attained, elucidated, and ultimately agreed upon.

Environmentalism:

I am sure that everybody has an idea or image that comes to mind when one hears the term 'environmentalism'. I also imagine we all have some familiarity with environmentalists, whether it was a local protest over a housing development, or a Greenpeace direct action seen on the news. What I am suggesting in this paper is that we take a broader view of this activity, so that we include under the banner of environmentalism the process of scientific discovery, which I assume everyone is also familiar with.

The argument under investigation is that the emergence of a new idea in science exhibits the same communicational characteristics as an idea that environmentalists hope to introduce into the world. At first the new idea seems unsupported, or as in aesthetics we would say 'appears grotesque'. Next, the special methods of science are engaged to persuade us that this new form really does explain something we are genuinely puzzled by.

I want to make it clear, however, that in the present context my primary focus is to develop a semiotic *theory*. May aim is to explicate a theory that is a method for discovering methods, specifically, a method that will help to explain the method of environmentalism. As a consequence, my research has been largely *theory seeking* rather than *fact seeking*. To obtain my purpose, I did not need to gather new data by special techniques of observation. The data semiotic works with is the everyday knowledge each of us uses to think with every moment of the day. As such, semiotic theory can be applied to any special interest we might want to put it to.

The above noted, I am not by any means claiming that semiotic is the *only* method we can use to find something out or make decisions based upon. For example, we can use voting

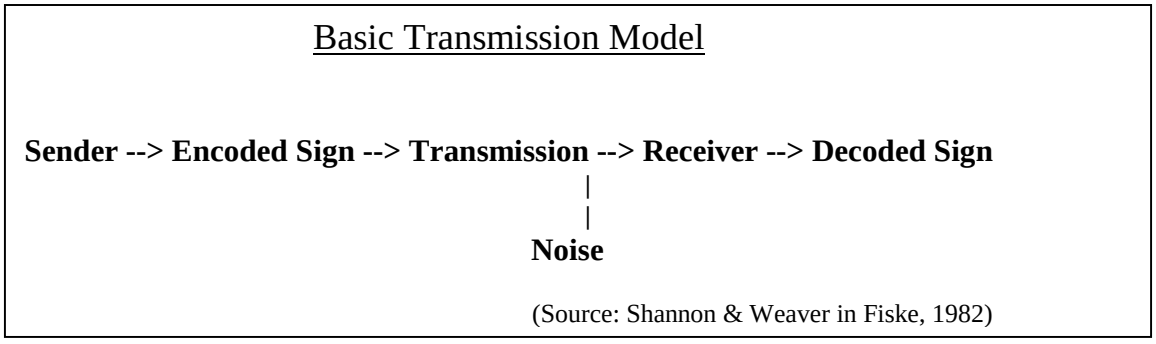
rather than science to decide something about the world by next Tuesday, if we want to. What I *do* claim here is that semiotic is a scientific theory. This claim involves an intellectual commitment to the belief that, if the method of science is persisted with it should eventually transform the ways we interact with the world in a way that concords with, or is compatible with, the ways the world itself thinks. Thus, in my view science can deepen our understanding of other beings and broaden our ability to co-exist interpedently within a dynamic system.

To demonstrate how Peirce's semiotic offers support for the above view, in the next section I will examine what semiotic logic is, what are its elements, and how these elements interrelate to form a system for analysing scientific communication, including environmental communication. This will then be followed by an application of the theory to a case study in environmentalism.

Peircean semiotic framework:

Semiotic investigates how we *infer* something from a sign. Put another way, semiotic is a theory of how signs work. In both these statements I have used the word *sign*. The most fundamental requirement for semiotic is an adequate definition of a sign. Why does semiotic need this?

Let's begin by looking at a couple of well-known models of communication. I will then discuss why these models do not yield an adequate definition of a sign for the purpose of science communication.



In Shannon and Weaver's (in Fiske,1982) transmission model of communication we can see that the sign is thought of as a language of some kind and is embodied in a code. We are all familiar with how signs operate as codes, and how coded messages can be transmitted, for example, as a digital code transmitted through a modem which is then decoded. What is being transmitted is information and this must be decoded by a receiver. To do this, the receiver must use conventions, such as spelling and grammar.

I would welcome being corrected on this point, but I am unable to see how the transmission model would enable us to discover something new about a world that is

independent of the code. True, we can detect errors in transmission, such as mistakes in spelling or grammar, but this model does not explain how we are able to learn anything new from this kind of error. All it does is show that we can make blunders in our coding, or that our transmission devices introduce errors of some kind.

The next model I want to look at was developed by Saussure (in Fiske, 1982), a contemporary of Peirce's working in Europe. Saussure proposed that we need two things to explain *language* - a *signifier* and a *signified*.

Saussure's Elements of Meaning

(Source: Fiske, 1982)

Both the transmission model and Saussure's model are adequate to explaining *language as a system of signs-in-code*. Semiology, which gave rise to structuralism, post-structuralism and postmodernism, is the study of language codes. With respect to Saussure's model, I am similarly unable to see that it adequately explains how a new idea is introduced into a language code.

As Pierce might have put it, in making language codes and code functions the focus, both the models I have briefly examine, 'commit the trifling oversight of forgetting that there is a real world with real actions and reactions'. In other words, the above models effectively eliminate the possibility of scientific discovery from the research interest. To use a term from Peirce, these models are *dyadic models* of the sign. The signifier is connected to a signified, which in turn is connected to another signified, and so on, ad infinitum. Put another way, if we add a straight line to the end of a straight line, we just keep on obtaining a straight line.

In contrast to the above dyadic models, Peirce argued that we need *three* things to adequately define the communicative function of a sign. To find out things about a real world that is independent of our language codes, we need a *sign*, an *object*, and an *interpretant*. The triadic relation that obtains between these elements allows us to communicate about a world that is independent of our opinions of it, but not independent of communication generally. Thus, a triadic account of communication enables us to talk about a world that does not depend solely upon pre-established codes for interpretation.

This means that a triadic model can allow us to detect errors and therefore possibly attain a true conception of some aspect of the world we live in, if we were to persist in the method for long enough. We may never get to that ultimate true opinion, but in science, that is our cheerful hope.

Now, from my reading of Peirce's vast corpus of writing and the secondary literature, I have been able to identify more than one hundred sign definitions given by Peirce. The problem I have in presenting one of these technical definitions here as the simplest and most easy to comprehend is that Peirce's definitions are triadic, and therefore cannot be reduced to the simplicity of a dyadic definition, that is, not without rendering the definition incomplete and consequently inadequate to our task. So, rather than just give the triadic definition straight up, I will follow Peirce's method and present three *grades* of definition. I will explain why a triad of grades is important to semiotic in detail shortly, however, for the present, let's begin with a familiar notion of a sign and work toward a more technical definition by adding elements to it. Once this is done, I will then present an integrated definition suitable for the task of understanding scientific communication.

THREE GRADES OF SIGN

First Grade of Clearness
(The clarity of everyday use -- the purpose of a sign):

"A Sign [is a] Medium for the communication of a Form"

(Source: MS 793[1])

Second Grade of Clearness
(The analytic or formal definition -- the necessary conditions for a sign to act as a sign):

"I use the word 'Sign' in the widest sense for any medium for the communication or extension of a Form (or feature). Being medium, it is determined by something, called its Object, and determines something, called its Interpretant."

(Source: SS 196)

Third Grade of Clearness
(Pragmatic or scientific adequacy -- does the sign produce the habit the concept is calculated to produce):

[A sign is] "something by knowing which we know something more"

(Source: CP 8.332)

A DEFINITION OF SIGN FOR SCIENCE COMMUNICATION

"[Let us acknowledge as being possible] a universal art of rhetoric, which shall be the general secret of rendering signs effective, including under the term 'sign' every picture, diagram, natural cry, pointing finger, wink, knot in one's handkerchief, memory, dream, fancy, concept, indication, token, symptom, letter, numeral, word, sentence, chapter, book, library, and in short whatever, be it in the physical universe, be it in the world of thought, that, whether embodying an *idea* of any kind (and permit us throughout to use this term to cover purposes and feelings), or being connected with some *existing* object, or referring to future events through some existing object, or referring to future events though a *general rule*, causes something else, its interpreting sign, to be determined to a corresponding relation to the same *idea*, *existing thing*, or *law*."

(Source: MS 774)

The integrated definition is especially appropriate for our present purpose. Peirce formulated it for an audience interested in the subject-matter that I am examining here: *scientific communication.* In this last definition, then, we see an important characteristic of Peirce's method that I want to draw out in some detail. Note the repeated triad *idea, existing thing or idea,* and *law or rule.*

Peirce's theory of semiotic draws upon his phenomenology. Phenomenology is the study of what appears before any mind. Based on his study of what appears before any mind, Peirce developed *three categories of being*. These categories correspond to three distinguishable modes of being, which he called Firstness, Secondness, and Thirdness:

THREE CATEGORIES NECESSARY FOR REASONING

Firstness (idea):

Potentiality is the absence of Determination...not of a mere negative kind but a positive capacity to be Yea or Nay; not ignorance but a state of being...

Secondness (existence):

Actuality is the Act which determines the merely possible...

Thirdness (law):

Necessitation is the support of Actuality by reason...

(Source: MS 277 in Fisch, 1986, p. 177)

Now, in relation to what I was saying earlier about my method of researching the question 'Is environmentalism a form of science communication?', we can see that my method is primarily located in the mode of Firstness. I am *seeking a theory* that will enable me to evaluate the rhetoric of environmentalism. This question was at first vague inasmuch as there was no pre-existing determination of 'yes' or 'no' to my question. Instead, there was a possibility that Peirce's theory would prove to be useful if the necessary consequences of its being true could be traced out and then applied and tested. This latter testing activity takes place primarily in the mode of Thirdness. In this modality the researcher *seek out facts* to support a theory, which is the exercise we are now engaged in. The rationale for linking these two realms, *theory* and *facts*, falls into the mode of Secondness because in this mode, the consequences of the theory are logically necessary.

Thus, following from the above, in the mode of Firstness, the principle of contradiction does not hold. A real possibility both exists as such, yet does not exist in actuality, thus Firstness is what the mathematician might call an 'indeterminate limit between A and not-A'. Similarly, in the mode of Thirdness, the principle of excluded middle does not apply. When we act on the basis of our reasoning, we do not know for certain whether our prediction will afford security. Our ideas are capable of falling somewhere in-between true and false, or as Werner Heisenberg might have put it, in Thirdness there is *necessary uncertainty*.

Peirce's discovery of triadic logic was motivated, I believe, by his desire to combine rhetoric with logic. In formal or dyadic logic, there are rules for reasoning that one is not supposed to be able to breach if the reasoning is to be considered valid. Yet in triadic logic, this is precisely what must happen if we are to learn something new. Thus, Peirce discovered a way to combine logic and enquiry, but without abandoning his commitment to the discovery function of rhetoric.

Triadic logic, then, or what I shall call the *logic of dissent*, does not involve any denial of traditional or dyadic logic, but rather, it involves an *addition* to it. We can see this by noting that the idea of Thirdness presupposes the idea of Secondness, which in turn presupposes the idea of Firstness. Put in modal terms, the 'would be' of law presupposes the 'must be' of actuality, which presupposes the 'may be' of real possibility.

Still another way to put the above is to say that Peirce's theory of signs implies that all *deductive* reasoning, including mathematics, must involve both experiment *and* observation. I have now introduced another term that requires some explanation.

From the beginning Peirce recognised three kinds of argument: *abduction*, *deduction*, and *induction*. What he did to arrive at this triad was to oppose the logic of mathematics (or what was called analytics) over against the logic of science (or what used to be called synthetic reasoning). The opposition of these two forms of reasoning yielded a triadic classification of argument, each with its own relative strength according to its modality:

CLASSIFICATION AND RELATIVE STRENGTH OF ARGUMENTS

1) Abduction

...produces assurance of the *may-be* -- Plausibility -- which is related to the iconicity of the relationship between premise and conclusion.

Starts with scrutiny of the puzzling phenomenon and produces a conjecture that would explain it.

2) Deduction

...produces the assurance of *actually is* -- Certainty -- which is related to the indexicality of the relationship between premise and conclusion.

Explicates the conjecture and renders it distinct, and this is followed by a Demonstration.

3) Induction

...produces the assurance of a *habit*, the what-we-take-to-be, which if it is not true, is open to correction by future enquiry --Verisimilitude -- that which is related to the symbolic nature of the relationship between premise and conclusion.

Ascertains how far the conjecture accords with experience - if it is sensibly correct, requires modification, or must be entirely rejected.

(Source:Peirce CP 6.469f.)

Note that in these three grades of argument, the same categorical entailment I mentioned earlier is also identifiable. To use an inductive form of argument, that is, to test our abduction, we presuppose that a deduction has already traced out what we consider to be the necessary consequences of the idea. Similarly, deduction presupposes that an idea or quality has been abstracted from the realm of possibility, and that this idea or quality is at least plausible. From a semiotic point of view, both abduction and deduction are equally ideal. It is not until the inductive stage, (the realm of scientific argumentation) that we test the idea in a world that is external to our ideal construction of it.

Another important consideration I want to mention is that an abduction is not necessarily based in a pre-existing term. Although connected with and arising out of our pre-existing knowledge, the idea may need an entirely new term to describe it. It is a *form* introduced to explain something that could not be explained by inductive reasoning. For example, until Kepler the orbit of Mars was assumed to be circular. New observations were made that could not be explained by this theory, so Kepler introduced the idea that the orbit of

Mars might be elliptical. This idea did not exist in respect to Mars until Kepler asserted the idea, yet it was always a possibility, and as such it already existed. Kepler, like all good scientists, became a dissenter for a reason. His reasoning was later confirmed by observation.

At this point I must forego any further theoretical enquiry and move to the application of semiotic theory to actual events.

Application:

In my master's thesis (author details suppressed, 1993), I analysed the method of nonviolent action used by an environmental group called the Rainforest Action Group. The present research is essentially an extension of that earlier work. This time around, however, I have been more interested in a theory that might explain the method of environmentalism and less interested in the descriptive aspects of the research.

In this earlier study, it seems that I was vaguely heading in the direction of a Peircean framework. I proposed that environmentalism follows a *three stage* process sequence:

PROCESS PHASES OF AN ENVIRONMENTAL DRAMA

Breach or Separation - the law of mounting stakes

Crisis or Conflict- the law of emerging contradiction

Reintegration or Schism - the law of shifting terrain

(Source: Turner 1982, p. 69; Foss & Larkin, 1986, pp. 60-63)

It did not occur to me at the time that this process triad could be linked to Peirce's semiotic categories, or indeed, that Peirce's semiotic offered a way to describe the movement of thought in environmentalism generally, that is, at the most general level, the movement of thought as a system.

This time around I am seeking to link logic to processes. The present investigation is a study of the *logical method* of environmentalism. I can now ask, "Does the method, or is the method if persisted in, likely to attain its aim from a logical point of view?".

So, what is the aim of environmentalism? I define the aim of environmentalism as the development of reasoning that has an attraction for *living* facts. In other words, the aim of environmentalism, as I define it, is to reason in a vital or organic manner, so that our interventions into nature can be accommodated by nature, rather than cause dislocations or dissociations. Thus, environmentalism, in the sense I am using it here, aims to

cultivate rational *representations* of thought, and in doing so, environmentalism presupposes a commitment to ethics, and also a commitment to aesthetics.

THE TRIVIUM OF ENVIRONMENTALISM

Aesthetics:

Considers things whose end is to embody feelings.

Ethics:

Considers things whose end lies in action - that is, it examines wise or foolish conduct.

Semiotic (Logic):

Considers whether or not the representation shows us something is actually operative.

(Source: Peirce in Turrisi 1997, p. 71)

I next hope to show why Peirce's semiotic method of analysing the method of environmentalism yields the above triad.

After completing my master of environmental science degree, I worked on a publication called the *Good Wood Guide.* The *Good Wood Guide* is a document that arose out of the Rainforest Action Group's protests about rainforest destruction by unsustainable logging. The question the *Good Wood Guide* attempted to answer was, if we accept your assertion that rainforest logging is unsustainable, what timbers should we avoid, and which timbers are 'good'?

The first thing I want to note about this question is that it arose out of considering the conceivable effects of rainforest logging, and these conceivable effects were drawn to the attention of the public by the method of environmental protest. The environmental concern itself, however, was based on the *emotive* experience of a group of people living in a rainforest - namely, the Penan people of Sarawak.

Desperate Penan block a logging track. (Source: ttp://www.rengah.c2o.org)

The Penan noticed that the theory they used for sustaining themselves in the rainforest was no longer yielding predictable results. The application of their theory of living to a rainforest environment was yielding surprises -- for example, they noticed that the rivers they relied upon for fishing were becoming hostile to aquatic life, and that they could no longer rely on their rivers as a source of food. To explain this failure in expectation, they had to, as a matter of survival, develop a theory to explain their surprise. Their theory was that the commercial logging of rainforest was making life in the rainforest impossible to sustain.

In this next diagram I hope to show that the purpose of the *Good Wood Guide* was to see whether the distinction of good or bad conduct drawn out by the oppositional protest of the Rainforest Action Group, which in turn arose out of the felt dislocation of the Penan, could be found to be operative (that is, could be operationalised) in the choice of timber products.

Put another way, the *scientific* research as to whether or not a particular claim was true came out of the *vital* experience of a group of people living in the rainforest - primarily the Penan of Malaysia. The research, as such, arose out of the experiences and difficulties of people attempting to live in harmony with their environment, but the truth of their claims was in no way dependent on their opinions alone. A *theory* was proposed, and the *facts* then investigated.

What I hope the diagram below shows is that the need for a theory did not arise out of nowhere, but rather, that the need for new knowledge arose out of an application of science to the real world: the Penan sought a theory to explain a failure in what they took to be reliable habits for living (the science of living in a rainforest). The theory of logging being used by the loggers in Sarawak was producing unexpected consequences for the Penan. The loggers, for their part, did not notice any surprising variations in the quality of the environment because they did not expect anything of the environment except that it should continue to offer them a cheap source of timber.

APPLICATION: THREE STAGES OF ENQUIRY

1) PENAN - SARAWAK

Abduction:

The logging of rainforest would explain the deterioration of the environment.

Expression - *feeling* - Firstness

Validity - Instinct

2) RAINFOREST ACTION GROUP - MELBOURNE

Deduction:

Australia is implicated. Australia imports rainforest timbers from Sarawak. This can be demonstrated.

Expression - *opposition* - Secondness

Validity - Explication

3) GOOD WOOD GUIDE

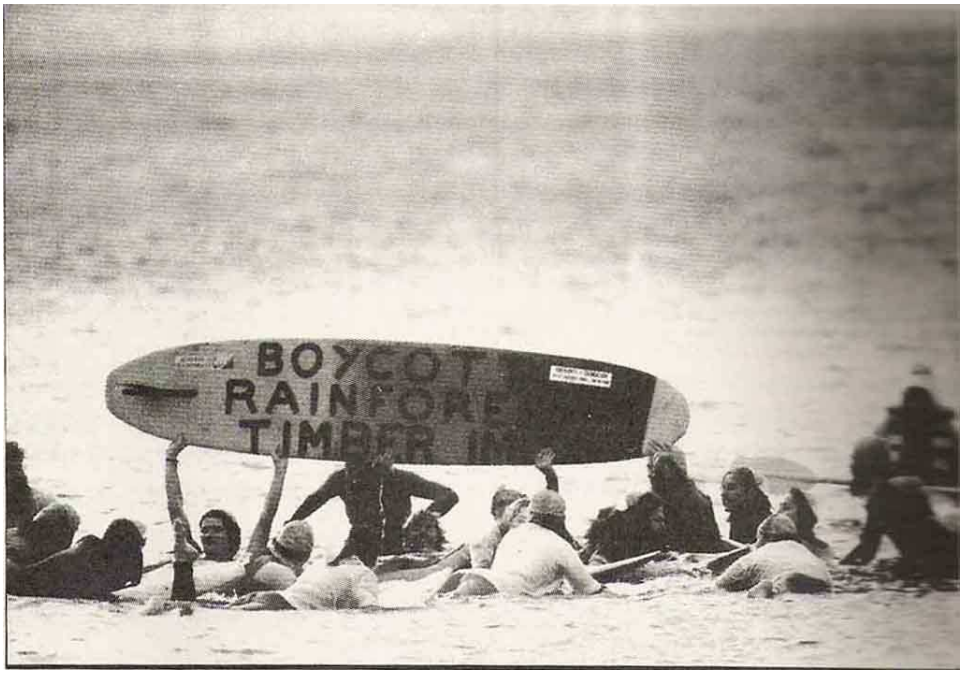
Induction:

Timber can be distinguished by point of origin and consumer choices can be made on the basis of environmental concern.

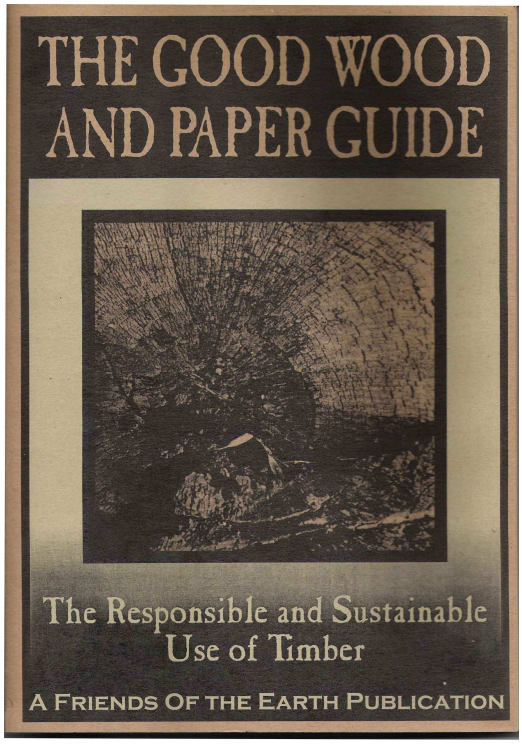
Expression - *scientific* - Thirdness

Validity - Evaluation

Something had to be done to draw out the unexpected consequences of unsustainable logging. The Rainforest Action Group found a way to make experimentation with the idea possible and then demonstrated this. Their method was to interpose themselves between ships laden with timber bound for Melbourne, and in doing so they literally embodied a diagram that demonstrated the environmental concern.



The *Good Wood Guide* then sought out facts to evaluate the theory as embodied by the protesters. Some of these facts confirmed the thesis that rainforest logging, as it was being practiced, was not sustainable, while others confirmed the thesis that alternative timber products and forestry methods existed.



The second point I want to make about the *Good Wood Guide* is that it *grew*. The *Good Wood Guide* began as an A4 flyer and is now a book length publication. The ninth edition is currently being researched in Melbourne.

The business of semiotic, in a nutshell, then, is to investigate how ideas *grow*, that is, how thought evolves. The testing of a theory has now grown into a substantial body of research, and this research is ongoing. This, I suggest, is how science grows - the growth of science it is essentially a *communicative practice*.

The next point I want to make in relation to the *Good Wood Guide* is that the question it investigated can be restated in a *pragmatic* form:

If a consumer wants to consider the meaning of timber, this idea will consist entirely in the effects that the idea could conceivably have in subsequent thought and experience.

The question put in this form is a question in the form of what Peirce called, *the Maxim of Pragmatism*, which is:

PEIRCE'S PRAGMATIC MAXIM

Consider what effects that might conceivably have practical bearings we conceive the object of our conception to have: then, our conception of those effects is the whole of our conception of the object.

An alternative but equivalent formulation:

The maxim of pragmatism is that a conception can have no logical effect or import differing from that of a second conception except so far as, taken in connection with other conceptions and intentions, it might conceivably modify our practical conduct.

(Source: Peirce in Turissi 1997)

I include the last definition because it makes the need for an adequate definition of a sign more easily manifest than the former.

The last thing I want to say about the *Good Wood Guide* is that in the process of researching and writing the *Good Wood Guide*, I found myself interacting with a group of people with a common special interest in the consequences of timber use. As such, we formed a *scientific community*, an important consideration in Peirce's view, as science is essentially a *social activity*.

Conclusion:

The focus in this paper has been on whether environmentalism is a form of dissent that adheres to the communicational commitments that guide scientific communication. My conclusion is that environmentalism is a form of opposition to scientific knowledge, but not necessarily to scientific method. Put another way, in a semiotic account of environmentalism, the method functions to keep communication closed (through its self-referential autonomy) and simultaneously open (through its communicational commitment to active engagement with its subject-matter) (cf. Luhmann, 1986).

I define dissent, then, as 'thinking otherwise', that is, to think in a manner that confronts and opposes knowledge that is held to be authoritative, fixed, proper, right, or natural. Thus, from a semiotic point of view, all reasoning, and here I include scientific reasoning, *challenges the status quo*. If this is admitted, we are also led to the conclusion that all thinking is fallible. The recognition of a necessity for error enables us to see that whatever we presently hold to be 'true' is something we can move on from, expand upon, or overturn.

I have also argued that via Peirce and his semiotic we can identify three grades of environmentalism, each corresponding to a predominant modal form of argument. To review briefly, in the first grade of environmental concern the greatest emphasis is placed on the feelings associated with an issue of concern. In the second grade of concern, the feelings identified in the first grade of concern are given existence in the mode of dualistic struggles, often expressed in terms such as "the conflict between nature and development". In the third grade of environmental concern, experimental reasoning becomes predominant. At this level of concern, environmentalists work to foster a co-operative community in which to evaluate whether the ideas that we use to guide us are achieving what we expect. From the point of view of semiotic, dissent is a necessary part of the process of evolving new value.

As it was Peirce who laid the foundations for semiotic, I will leave the final word on dissent to him:

"Do not block the way of inquiry."

(Peirce in Buchler, p. 54)

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