# APITHOLOGICAL SYSTEMS THEORY: LEARNINGS FROM ECOLOGY

**William Varey**
School of Social Sciences and Humanities
Murdoch University, Western Australia
Email: w.varey@murdoch.edu.au

## ABSTRACT

Apithology is the field of study that considers the generative dynamics of living systems. A distinguishing feature of apithological praxis is the inclusion of the effects of the system dynamics of human thought. This involves the depiction of systems of thought as complex inter-linked hierarchies in multi-spatial arrangements. This generates distinctive questions for the framing of its observations.

One field which has considered the problems of epistemological choices in formulating similar observations is the discipline of systems ecology. The proposition of this paper is that the learnings gained from the field of systems ecology may inform a theory of praxis for apithological systems inquiries.

Bateson (1972) proposed that deutero-learning (i.e. Learning II) occurs when there is a progressive change in the rate of proto-learning (i.e. Learning I) by adaptation of learning to different contexts. The presence of proto-learning within one field of thinking (i.e. ecological systems) provides the opportunity for deutero-learning in the field of thought (i.e. apithological systems).

Extending from the study of ecological systems, five questions are noted as junctures for the selection of framing choices in the observation of complex systems. Using a criteria for philosophical coherence, a conjunction of natural and service systems is proposed. From this base, five category errors of thinking that change the quality of the results of those framing choices are identified.

Within this premise, specific learnings gained from the study of ecological systems are applied as deutero-learning opportunities and adapted for the study of thought-ecologies. To conclude, apithological principles applying those learnings are proposed for the observation of systems of thought.

From this analysis, five observational protocols are derived as requirements for the praxis of apithology. Reflections are provided on the systemic effect of coherency in the presence or absence of these five considerations on the human capacity for knowing and unknowing. This leads to a third-order insight in practice for the enablement of generativity in the ecology of human thought.

**Keywords**: epistemology, ecology, systems theory, philosophy, deutero-learning

# APITHOLOGICAL SYSTEMS THEORY: LEARNINGS FROM ECOLOGY

## Introduction

The research field of apithology concerns the study of the systemic causes and effects of generativity and growth in living systems. It is the counterpart discipline to the field of pathology, which examines the systemic causes and effects of dissipation and decline in degenerative systems (Varey, 2008). The scope of apithology is potentially equal in terms of complexity to its counterpart field. A distinguishing feature of apithology praxis is the recognition of the dynamics causing generativity in systems of human thought. Being a humanistic paradigm, in terms of being primarily concerned with human system effects, the wellbeing of people and their environments is central to its philosophical premise. Accordingly, the practice of apithology requires a conjunction of natural and service systems theories. This is enacted within an appreciation of generative patterns in evolutionary systems psychology.

Apithological systems praxis relies on the consideration of the observer's own patterns of observation. This reflects a recognition of the second-order cybernetic effects of the observer's interactions in the processes of observation and intervention. Each observer is considered to be part of the systems' contributing dynamics, particularly in terms of knowledge and knowing. This includes an understanding of how the framing of an observation impacts on conclusions, depictions and evolutions. In apithology, while the process of observation is remote and objective, the capacity of the observer in terms of future effects, is considered to be proximate. Being an emerging systems discipline a dilemma for apithology praxis is how to engage mindfully in inquiries within an 'ecology of minds' (Bateson, 1972). One process for developing this might be within the limitations of trial and error learning.

Fortunately, a lineage of similar inquiries is present in other fields with complementary purposes. The research disciplines of the empirical, social and behavioral sciences specifically address such framing questions in their theories of observation (Denzin & Lincoln, 2003; Haack, 1993; Kaplan, 1964; Popper, 1983). Contemporary paradigms of research practice within these disciplines apply specific observational principles such as participatory inquiry (Reason, 1988), co-operative inquiry (Heron, 1996) and action inquiry (Torbert, 2004). An addition to these practices is the newer paradigm of apithological inquiry. Because apithology as a systems theory concerns multiple-scales of evolving complexity, of significance for useful comparisons are the research disciplines that consider living systems with hierarchical complexities. An analogical approach to apithology is therefore provided by the field of ecological systems theory. One field looks at the ecology of thought, the other, the ecology of life. The resulting recognition is that in their comparison there is a connection, and in fact, no separation (Bateson, 1979).

This paper asks the question: *What learnings from the exercise of observational choice in systems ecology might be relevant in developing a praxis in apithology?*

The context for this question concerns finding ways in which the ecology of physical worlds and the ecology of mental worlds relate to each other (i.e. 'the pattern than connects' (Bateson, 1979; Bateson & Bateson, 2005)). Of specific guidance in this inquiry is the lifetime work of policy theorist, cyberneticist and social systems scientist, Sir Geoffrey Vickers (1894-1982). Through various publications, Vickers (Vickers, 1968, 1970, 1978, 1983a, 1983b, 1987) raised many of the questions which a complex ecological approach to human systems eventually must surface. To ground any new learnings, illustrative references are made to the places within that body of work where similar questions might have been first considered in a systems context. It is argued that, even though modern societies have become increasingly more complex, such formative questions of human nature and our relationship to our environments, remain ever pertinent.[1] As one example, in framing the question of why psychological systems are not simply ecological systems (and might require a separate analysis), Vickers (Vickers, 1968) describes the question (and the answer) many decades earlier:

> This inner world, in which men inescapably live, develops in intimate relationship with the physical world, yet according to its own laws and its own timescale. Human history can be understood only as the interaction of the two worlds. The inner world has its own realities and dynamism – its own ecology. (p. 51)

The structure of this paper offers praxis for an analysis of the 'realities and dynamism' of the ecology of our inner worlds. It does this by attempting to learn from learnings in our previous investigations of the ecology of the physical world.

## Learning about Deutero-Learning

We can appreciate from our own experience that in addition to learning reflexive responses to set stimulations (Learning 0), humans (and animals) are potentially capable of forms of learning involving revisions of choice by the recognition of recurrent situations (Learning I) (Bateson, 1972). This is the capacity for 'proto-learning' where systems of rote and repetitive learning can speed up the selection of choices from patterned responses significantly (Bateson, 1972). A significant contribution of Gregory Bateson, being an anthropologist and systems scientist, was the recognition that humans (and some animals) are also capable of learning about these forms of learning (Learning II). A subsequent progressive step-change in the rate of proto-learning (i.e. a change in the set of alternatives used in Learning I) was called by Bateson 'deutero-learning' (i.e. Learning II). This form of learning is enabled by a change in how experience is punctuated by the use of context markers (Bateson, 1972). Essentially, by recognition of the familiar we become faster at learning in contexts that are dissimilar.[2]

However, in the field of apithology generative learning is evaluated with reference to its generative potentials. In Learning II, innovations are gained by virtue of our pre-anticipations of what we will find, being 'an expectation of a given contingency pattern' (Bateson, 1972)(p. 265). In relatively stable environments of continuity and consistency such learning provides reinforcement and security. However, in terms of the capacity of human systems to cope with uncertainty, change and ambiguity, the learning that comes from pre-empting the observation may enact forms of selection, negation and exclusion.

For human systems generally, the forms of learning that involve familiar patterns with no new seeing, particularly in contexts of changes in the natural and social worlds, may provide risks beyond their rewards.[3]

This question of the *quality* of deutero-learning was considered explicitly by Bateson (Bateson, 1972) who proposed that the 'apperceptive habits' of deutero-learning be acquired not 'by burning down the house' in a process of increasing acceleration, but by establishing generative learning conditions that appeal to individual 'free will'. Using the example of his and Dr. Margaret Mead's studies of Balinese culture, Bateson notes that generative learning might be better accomplished with 'sequences inherently satisfying in themselves' and suggests the enhancement of discovery might be accomplished by a focus on the 'value in the act itself' (to use Mead's phrase) using forms of hope and optimism that are not remote or future orientated. Resisting the stance of driving learning through a rote sequence of 'ever-immanent but indefinite dangers', Dr. Mead proposes instead a habit of deutero-learning 'inspired by a thrilling sense of ever immanent but undefined reward' (p. 148). Bateson's distinction in the quality of deutero-learning might therefore be described as the difference between 'purpose-focused acceleration' and 'person-based appreciation'. In doing this, we might appropriately rely on the capacities for human intrigue, excitement and caring.

This recognition accords with Vickers's (Vickers, 1983a) own analysis and belief in the detrimental role of 'purpose' in learning. The balancing of our ends requires attention to our means. In his analysis of success, it is the 'meaningfulness of the means' that is necessary for the psychological satisfaction that drives fulfillment of the 'appreciative system'. This problem, of the balance of efficient means and ultimate purpose (i.e. being the distinction between the psychologically satisfying and the practically satisficing) is highlighted acutely by Vickers (Vickers, 1983a):

> The concept of purpose obscures the concept of success still farther. For first it assumes that the purpose is worth pursuing and thus commits the evaluating mind either to some ultimate objective which is worth pursuing for its own sake, or to an infinite regress in which every goal is sought as a means to some even more remote 'end'. It also commits the evaluating mind to the absurd assumption that 'means' are in themselves value-free, comparable only by their efficiency in attaining some desired end. (p. 170)

In deutero-learning we speed up our knowledge acquisition, gaining from the learnings in one discipline by application to another. However, Dr Mead explicitly draws attention to the 'dangers inherent in the habit of thought' (p. 134) directed to some 'blueprinted goal'. From these theorists we can appreciate that the problem of human learning is not in the slow pace of its accumulation, rather it is the orientation of the face of its intended direction. This description provides the reasons for the distinctly different inquiry that is an apithological analysis of Learning II situations. As well as gains, there are also questions within our assumptions concerning the quality of what is learned across contexts (i.e. Learning III), described by Bateson as 'trito-learning' (Visser, 2003). To facilitate this deeper inquiry, three aspects of apithological deutero-learning are considered, being: 1) *composition*, 2) *coherence*, and 3) *contraction*.[4]

## Observational Composition – Five Junctures

One potential for deutero-learning in apithology is found in the framing of epistemological choices in ecological hierarchy theory (Ahl & Allen, 1996). In this analysis, hierarchy theory is seen as 'a theory of the observer's role in any formal study of complex systems' (Ahl & Allen, 1996) (p. 29). As an abstract application it describes principles that may operate in contexts wider than merely the ecological or biological. In providing a model for observation that makes explicit the contributions of the observer from the observed, 'hard-nosed protocols' are offered for 'observing complexity without confusion' (Allen & Hoekstra, 1992). This outcome is also desirable in the study of the complexity of systems of thought. As the field of apithology specifically concerns the study of complex human systems involving the conjunction of multiple frames of observation, ecological hierarchy theory may provide an invaluable direct parallel facilitating the development of efficacious praxis.

Specifically, Ahl and Allen (Ahl & Allen, 1996) propose five-steps as an iterative process to structure the epistemological choices necessary in the observation of complex hierarchies, being 'five junctures at which an observer's decisions are crucial to structuring an observation' (Ahl & Allen, 1996) (p. 35). Questions are posed to demark five points of injunction as punctuations in the formal stages of observational research. In summary they are framed as: 1. *question formation*, 2. *entity definition*, 3. *measurement selection*, 4. *phenomena recognition*, and 5. *modeling predictions* (Ahl & Allen, 1996).

These five categories of choice in structuring ecological inquiries highlight the reciprocity between the observer and the observed in a constructivist approach to ecological research. Rather than being a sequence, they operate as a 'tensegrity' structure (e.g. a web-like frame) with each choice forming and being formed by the potential answers for each. At each juncture of choice the relationship of the observer, to the observed, and to the function of the observation, changes. Each question can be answered independently, yet each answer has significance for the choices available for selection for the other questions in a non-linear sequence. What results from the combinational set is a coherent articulation of the research assumptions and limitations appropriate to the specific research inquiry. The space that their conjunction defines is argued to be indicative of the capacity for knowledge and knowing in that scientific investigation.

In a practical sense, a choice of ontological criteria (e.g. landscape) may limit the viability for observation of the range of entities selected (e.g. bacteria), precluding observations otherwise than with appropriate choices for measurement (e.g. satellite imagery of the spread of forest disease by foliage die-back), to be of service in ethical, aesthetical or spiritual intentions (e.g. ecological conservation), and posing models of rhetorical conviction (e.g. ecosystem collapse). Such elements of choice occur whether they are made explicitly, habitually, or implicitly by default in the absence of their express consideration. The primary benefit of a conscious approach is 'observational transparency'. Hypothetical assertions can then be validated by equivalent level observations. This criteria of *composition* enables further learning to occur from otherwise unstructured and fragmented ecological inquiries (Ahl & Allen, 1996).

Reflecting on the concept of the 'web-like frame', the metaphor is similarly expressed by Vickers (Vickers, 1987), in describing the conjunctional role of the social scientist:

> The sanest like the maddest of us cling like spiders to a self-spun web, obscurely moored in vacancy and fiercely shaken by the winds of change. Yet this frail web, through which many see only the void, is the one enduring artifact, the one authentic signature of humankind, and its weaving is our prime responsibility. (p.30)

This selection of observational choices as junctures in observing complexity leads to the formation of a philosophical premise, which ideally should also have a logical coherency.

**Philosophical Coherence – Five Domains**

The five juncture questions proposed for scientific investigations find support in the theory on method selection in the social sciences. In a conjunction of paradigms, Creswell (Creswell, 2007) in extending on the work by Guba and Lincoln (Guba & Lincoln, 1994) proposes five categories as a heuristic frame for the architecture of theory articulation [5]. These five elements are the: a) ontological, b) epistemological, c) methodological, d) axiological; and e) rhetorical categories of philosophical assumptions.

The *ontological* assumption describes the nature of the reality assumed and researched and its presumed contents of significance. The *epistemological* assumptions concern the nature of knowledge and the validity of the forms of knowing relied on in undertaking the research. The *methodological* assumptions concern how the entire research process is conceptualized in enacting the epistemology, as a means of revealing the ontological reality. The *axiological* assumptions are the ethical, aesthetical and spiritual values that cause emphasis to be placed on certain value-laden priorities of meaningful phenomena from the method designed. The *rhetorical* assumptions are reflected in the voice adopted, specific terms proposed, the models used and the narrative frames within which the assertions of findings are situated, interpreted and communicated (Creswell, 2007; Guba & Lincoln, 1994; Lincoln & Guba, 2000).[6] This meta-pattern of conjunctions enables an recursive evaluation of philosophical coherence. Coherence is established by a consistent relationship being in place between these five dimensions. This is reflective of the tensegrity structure proposed in the correct application of the five junctures previously mentioned (Ahl & Allen, 1996). The recognition of the need for *coherence* in the five domains provides a second dimension to error-correction (i.e. enhancing Learning II).

The reason for attention to this inquiry in apithology, is that in proposing a scientific approach to observational protocols for the social and ecological sciences, a dilemma of primacy occurs between the observer and the observation. The paradox is stated as: Did the observer form the observation, or did the observation form the observer? Often from the position of objectivity correctly adopted in the behavioral sciences, the potential for psychological observational bias is subsumed into assumptions of observational realism. In the systems sciences, where observations are often made in the form of abstract models or descriptions, this paradox of the objectivity of the observer in forming the observation is further exacerbated. Vickers (Vickers, 1968) previously describes this question and its resolution:

> Human mental activity is indeed only part – a small and peripheral part – of the subject matter of science. It is, however, equally true that the whole of science is only a part – smaller and more peripheral part than we always remember – of human mental activity. Confronted with these two Chinese boxes, each of which claims to contain the other, we may conclude that the human agent is more than he knows and probably more than he can ever know. (p.67)

The point made is that transparency in the formation of even the most objective of empirical observations reflects that all scientific inquiry is done by 'thinkers'. It is for this reason that an apithological systems theory of learning concerns itself with the dynamics of formation of 'thought'. In apithology, deutero-learning does not only need to be generative and transparent, it also needs to be coherent. The proposal is simply that in recognizing human error in the framing of scientific observations great insight is gained by the evaluation of the effect of philosophical *coherence*. This recognition of our capacity for the delusion of objectivity increases our intimacy with the essential 'humanness' present in the ecology of our thoughts.

## Apithological Contraction – Five Errors

The additional contribution of an apithological approach to Learning II situations is to bring to awareness the potential Learning III recognition of errors in Learning II choices. The five 'juncture-questions' (Ahl & Allen, 1996) represent a compositional approach to observational research, containing components that are independent and relational. This also requires a coherent application of ontological, epistemological, methodological, axiological and rhetorical assumptions. However, drawing from Bateson's (Bateson, 1972) description of the 'choice within choice' and the generative distinction in deutero-learnings, a further consideration is required. This relates to the unconscious motivations for the observations, which sometimes result in an unintended contraction or reduction in knowledge or knowing.

In outlining a process for scientific investigation in complex ecologies, Ahl and Allen (Ahl & Allen, 1996) identify two primary problems of observer-based distortions when working in hierarchical ontologies. These are naïve realism and logical typing errors. Naïve realism concerns the ontological limitations of the observer's awareness of their own frame of reference.[7] Errors in logical category typing concern the conflation of data into one observational set which is epistemologically separate in terms of levels of observation. To follow this lead, an expansion of Ahl and Allen's (Ahl & Allen, 1996) primary forms is proposed. These reflect a consolidation of five major categories of observer-based distortions of which any apithological, philosophically-coherent, hierarchically-complex, observational protocol would need to be cognizant. They are:

a) *Naïve Realism* (Ontology): The tendency to assert that the entirety of what appears to the observer within their own ontological frame is the entirety of all ontological framings, neglecting the corresponding levels of constraint and entrainment that make that position ostensibly tenable.

b) *Entity Reification* (Epistemology): The familiarization with a conceptual object to such an extent that the boundary between ontological existence and observational construction ceases to have any relevance.

c) *Gross Simplification* (Methodology): The selection of observation parameters, focused around a reified object, that excludes or negates relevant information, collapsing or reducing key observations into simplistic or problematically bounded conclusions.

d) *Values Projection* (Axiology): The interpretation of otherwise neutral data using filters or frames that evoke value-laden personal biases in either importance, significance, or prevalence, in particular universalizing to others one's own personal experience.

e) *Normative Assertion* (Metonymy): The predilection to compare ostensibly objective interpretations and reformulate them to confirm or conform to a pre-existing narrative or model of illustration, extending to prediction of future events based on models or expectations not supported by the underlying data.

This set of categories for observational error provides the observer-researcher with the combined guidance of a conjunctional frame of philosophical coherences, observational transparencies and recurrent observational problems, all which can be represented in a unified format (see Table 1.1).

**Table 1.1 – Protocol Questions and Observational Research Problems**

| Element | Philosophical Domain | Ecological Research Protocol Question | Observational Problem |
|---|---|---|---|
| I | Ontology | What is the research question? | *Naïve Realism* |
| II | Epistemology | What is the entity or unit of focus? | *Entity Reification* |
| III | Methodology | What is to be included as relevant? | *Gross Simplification* |
| IV | Axiology | What is the phenomenon of significance? | *Values Projection* |
| V | Metonymy | What is the narrative model of prediction? | *Normative Assertion* |

The effect of explicitly defining these potentially available distortions helps to explain why, even when using our best learning, we might move no closer to the solutions we truly desire (Allen, Tainter, & Hoekstra, 2003). In our attempt to *contract* away from, to *close* down to, and *control* rigidly the problems of our greatest anxiety and significance, there is the risk that learning becomes patterned into forms of avoidance. In essence, in enhancing our learning by learning from past patterns of errors, we risk amplifying the extent and effect of former distortions. In an apithological approach to thought-ecologies, the challenge set is to alter those patterns generatively. This sentiment is reflected in Vickers's (Vickers, 1970) recognition that, in a cybernetic sense, continuation of our learning from situations which continue our own destruction might eventually even lead to learning realizations. This passage contains his poignant summary of our predicament:

> The critical question is whether the innovations enforced by such emergencies are seen as the defence of an existing order or the creation of a new one. Viewed in the first light, they will fail and induce the sour desperation always associated with vain efforts to stem the flood of degenerative change. There is, however, the possibility that they may come to be viewed as innovative change and may induce collective confidence of another age of greatness. The behaviour of men today towards the ecological order which supports

> them cannot fail, I think, to arouse disgust in any mind which realizes it. The self – exciting system cannot long command respect after it is seen as self-defeating. The facts are becoming known; only the trigger of some personal experience is needed to give it reality. From that disgust could arise the concept of the new ordering and pride in a new order. (Vickers, 1970) (p. 194)

The remainder of this paper therefore makes use of learnings already available to propose 'a concept of the new ordering', to enable the 'pride' that may otherwise elude us in advancing solutions aimed only at stemming the floods of degenerative change. This is done by taking five learnings from the analysis of philosophically coherent observational choice in ecological hierarchy theory and deriving from these learnings five observational protocols for application in apithological systems theory.

## Ecological Theory – Five Learnings

*Ontological Hierarchy*

The first learning that can be derived from hierarchy theory in the scientific investigation of complex ecological systems is how underlying ontological assumptions set the potential for the disclosure or obscuration of multiple levels of phenomena. The primary point is that the error of conflation often occurs well before any research is conducted, findings are discussed, or interpretations and predications are made.

As Ahl and Allen (Ahl & Allen, 1996) write: 'As soon as a question is formulated, certain constraints immediately follow' (p. 37). The primary constraint is the limitation of the ontological assertions that are implicit to the chosen level of observation. We understand from hierarchy theory that units and levels are not features of an external world, rather these are generated relative to the point of view taken by the observer (Ahl & Allen, 1996). The attribution of complexity, being a result of interactions between levels, is a 'product of asking questions in a certain way' (Ahl & Allen, 1996)(p. 33).

This feature of the selection of ontological preference for the schema of organization for phenomena is made clear in the choices made in formation of the hierarchy of complexity. The form of hierarchy chosen defines the governing ontology for the inquiry itself. To illustrate the effect of this choice, a distinction can be drawn between three primary forms of ontological hierarchy, being a: a) *definitional* hierarchy, b) *empirical* hierarchy and c) *observational* hierarchy (Varey, 2010). These might be argued to ostensibly represent nominalist, realist and constructivist ontological biases respectively. Those familiar with the humanities, the natural sciences or the social sciences already understand these ontological biases intimately.

For example, a definitional hierarchy uses a pre-defined organizing criteria to sort phenomena into definitional categories (e.g. scalar orders). The classical biological ordering of life based on sentient capacity from single cells, to higher-order mammals, and then to modern humans, is an example of a definitional hierarchy. These ordering by varying definitional criteria are not wrong, if they are conceptually discrete, rather they

form a conceptualization unique to the observer operating as a purely logical (or semantic) exercise (Ahl & Allen, 1996).

An empirical hierarchy uses empirical observations as to differences (i.e. in size or specific features) to discern scalar levels as derived from the observed discontinuities in a continua of data (Allen & Hoekstra, 1991). An example might be the categorization of variations in body mass sizes of species to identify different ecological orderings in either community or predator prey relationships. The limitation of the empirical ordering is where the method of measurement contains reductionist assumptions such that the measures used may obscure (or negate) causal features in relationship dynamics that would otherwise be perceptible.

An observational hierarchy recognizes the researcher's role in the construction of the observation (Ahl & Allen, 1996). In a constructivist approach, the ordering of hierarchical levels depends on the situations the observer considers significant. The same empirical entities can be changed in order by altering the ontological assumptions of the reason for observation. An example is when undertaking a food chain analysis in terms of deciding whether an animal is 'food supply' or a 'predatory controller' when seen in relation to other potential prey or predators (Ahl & Allen, 1996). The limitation of this form of observation is that the interpretation of data is restricted by the meaningful scope of pre-existing constructions.

As the need for understanding complexity increases more mature inquiries require a conjunction of definitional, empirical and observational assumptions, and the ontological humility to observe the gradients and boundaries that denote observed discontinuities, in both the heterarchical and hierarchical ordering of functions (Allen, 2008; Allen & Hoekstra, 1991). To discover how a complex system is organized observations must be made from what is discernable from the system's functions located contextually, spatially and even historically. This approach recognizes the observer's role in establishing epistemological validity (Allen, O' Neill, & Hoekstra, 1999). In the observation of hierarchically structured complex systems (as opposed to those merely defined that way) it is therefore necessary to consider, at a minimum, three levels of organization:

> For any level of aggregation, it is necessary to look both to larger scales to understand the context and to smaller scales to understand the mechanism, anything else would be incomplete. For an adequate understanding leading to robust prediction, it is necessary to consider at least three levels at once: 1) the level in question, 2) the level below that gives mechanisms; and 3) the level above that gives context, role, or significance (Allen & Hoekstra, 1992) (p. 8-9)

The implication of these insights for the study of 'thought-ecologies' is to appreciate that, for each ordering principle that can be identified, this itself represents a unique conception ordered by reliance on ontological phenomena contextualized within the reality described. The observer, even when asserting a description of complexity using levels of organization, must realize that, in terms of their own thought structures, that they too are situated in a hierarchy of complexity of thought. In ontological humility, the extent of the validity of our assertions are always limited by the range of our perceptions.

This recognition, of the need for ontological acceptance of the respective contributions in each level of observation, for all structures of organization, was expressly described by Vickers (Vickers, 1970):

> There is nothing in the hierarchy thus viewed to make one level more important than another, unless it is its place in the hierarchy itself, which is, of course the argument on which rests all "organic" theories of society. Each level has its own significance. I have already examined the grounds which seemed to me to justify the primacy which we commonly accord to the level at which we happen to be. (p. 111)

In the ecology of thought, we each have a role to play. The significance of that contribution is never diminished by the personal recognition that ontological primacy is something we are not qualified, as individual observers, to observe directly. To step out of the ecology of thought is to step out entirely from human reality, which makes the significance of our assertions relevant only to oneself as an isolated unity. In the study of thought, ontological clarity about the level of observation selected is rewarded with complete dominion over the specified domains of our own selection.

Learning #1: *Ontological validity is not a function of belief; it is a function of contribution, situated within complexities beyond our observation.*

*Epistemological Entities*

The second learning from ecological hierarchy theory concerns the epistemological relationship of the knower to that which is to be known. This involves the definition of the entity and its relationship to the observer. This is achieved by the self-location of the knower within the corresponding selection of the relevant paradigm of inquiry.

The process of making an observation, by definition, can only occur by the separation of a 'thing' from the otherwise indistinguishable background of its context (Korzybski, 1958). This invites the process of reification which applies equally to identification of the tangible (e.g. frogs, trees) and the non-tangible (e.g. ecoservices, flows) (Ahl & Allen, 1996). Different definitional entities suggest different paradigms of observation. Yet the definition of the entity itself involves (albeit sometimes unconsciously) observational selection.

Because the human form is most familiar to us, the 'living organism' is often the default selection for many ecological inquiries, using the proximity to human characteristics of physical discreteness and genetic continuity as common key criteria for entity definition (Allen & Hoekstra, 1992). However, notwithstanding their anthropomorphic familiarity as 'living things', in a constructivist approach to ecological theory organisms are considered an anthropomorphic construct, no different to ecosystems, communities or abstract theoretical forms of open-systems (Allen & Hoekstra, 1992). We learn that ' … there is no reason beyond an act of faith to say that organisms are more real than ecosystems or any other ecological intangible' (Allen & Hoekstra, 1992) (p. 161). The definition of an entity, dominated in biological studies by the plant, and in ecological

studies by the organism, is seen as a necessary processes for each paradigm of observation (Allen & Hoekstra, 1992).

Significantly, for the observation of tangibles with proximately visible scales, our realist tendencies usually make the question of epistemological choice apparently otiose (Ahl & Allen, 1996). The experience of the 'thing' is directly perceivable with its immediacy of form providing a noticeable difference. For more remote tangible phenomena, requiring intermediary forms of observation (e.g. at their simplest, the microscope or telescope) the remote object is often only made existent commensurate with its observation (i.e. it begins to exists for us when we have looked for and found it). Counter-intuitively, phenomena that are in exactly the same scale as our observational frame, being too proximate to us (rather than too remote from us), are even less noticeable and so becomes ungraspable. Examples include: the essence of the quality of living, the nature of mind, what it means to be human, or how to measure changes in the present moment of experience (Ahl & Allen, 1996). For this reason, even the phenomenological 'self' requires our reification and so the concept of observing 'thought' for some is unreachable.

The implication for the study of 'thought-ecologies' is that for each observational entity selected its 'realness' is really a function of heuristic convenience (Travis, 2006). The selection of an entity and its corresponding paradigm of inquiry represents not precision, but preference. However, this is appropriate. We should acknowledge that the best observers are those most familiar and comfortable with the subjects they usually observe and the modes of observation they most frequently exercise. With familiarity comes the expertise of noticing difference acutely (and with acuity). However, the risk for the observation of emergent phenomena in systems of thought, is that the familiar mind forms the habit of noticing only the familiar. In exactness, we fail to see the very phenomena we are looking at and so lose what we were looking for. This recognition of how 'our ways of knowing' reciprocally generate and then hide the 'thing to be known' was also described by Vickers (Vickers, 1983b):

> The tendency to preserve form, which is characteristic of systemic relations, may be a marked or faint. It is a matter of convenience whether we regard some configuration of relations as stable enough to deserve the name of system, just as it is a matter of convenience where we draw the interface between a system and its surrounds. To describe it as a matter of convenience does not mean that it is arbitrary or illusory. (p. 120)

The role of astute selection in paradigmatic preference and entity definition makes it possible for similar phenomena to be revealed in novel and interesting ways by many new modes of seeing. The narrowness of reification provides only the comfort of self-confirmation. In contrast, the epistemic openness of defining an observation within multiple paradigms of conjunction means we might learn to 'see our seeing' anew within the fuller kaleidoscope of well-lit choices.

Learning #2: *Reification posits that something is ontologically real. Definition, on the other hand, only posits that it is observationally useful.*

*Methodological Scalability*

The third major category of choice from ecology theory is the methodological question of selection of scale. The selection of 'scale-determinate observational methods' sets the data category of relevance to the research questions. This enables the observer to discern heterogeneity from within homogenous phenomena (Allen & Hoekstra, 1991). However, at the same time, by the selection of scales of observation the phenomena revealed by both more and less detailed observations are then disregarded.

In complex hierarchical systems, the specifics of scalar resolution may negate levels of organization, collapsing complex systems into potentially grossly reductionist simplifications. By contrast, appropriate choices of conjunctions of scalar composition can reveal the rich dimensionality of hierarchical cross-scalar orderings, related dependencies and causal vulnerabilities that define complex compositional hierarchies (Allen, et al., 1999). To understand how scaling choices reveal and disguise phenomena a useful primary distinction is made between three observational dimensions, being *grain*, *extent*, and *frequency* (Allen & Hoekstra, 1991) (Allen & Starr, 1982). Their distinct differences are worth noting for the corresponding effects these choices enact as observational distortions. In this context, *grain* refers to the level of resolution (i.e. the granularity). It is defined by the finest distinction that is drawn reliably between phenomenal values or definitions. The dimension of *extent* refers to the span of all measurements in a study that circumscribes the entire set of variations that are included in the study (i.e. the parameters) (Allen & Hoekstra, 1991). It is defined by the widest criteria that can apply to a relevant phenomenon before it becomes unnoticeable or un-measurable, with phenomena outside that range being greater than the finite boundaries of the study's ability to conceive. The third dimension of *frequency* refers to the periodicity of the study, being the timeframe in which cyclical or repeating patterns of behavior would be perceived (i.e. the rate). It is defined by the longest timeframe for the specified phenomenon within which its variations would be perceptible. At their simplest forms, these dimensions are reflected in sample sets, sample sizes and sampling rates (Ahl & Allen, 1996).

The implications of these scaling choices are significant. If the behavior or condition of the entity or unit for observation is measured by a grain that is too coarse or too fine, in locations where it is perceived homogenously without differentiation, or using a frequency of sampling that misses fluctuations with time; the perception of the reality described will not match with the factual nature of the ecological system operating in real-time frames (Kolasa & Rollo, 1991). This leads to the understanding that the choices in observation of a thing, in terms of selection of size, scale, and frequency, often say next to nothing about the phenomenon itself, but almost everything about the nature of the observation used.

Therefore, the appropriateness of scaling-choice is one of the critical problems that must be considered if different ecological studies are to be either 'compared in a corroboration or contrasted in refutation' (Allen & Hoekstra, 1991) (p. 47). Disparately scaled

ecological situations cannot be compared in simple ways, even if they appear to be considering the same location or ecological situation (Allen & Hoekstra, 1991). With each change in scalar level there is the potential for a corresponding change in the emergent dynamics of relevance available for observation. Yet it is the disconcerting discontinuities that result at the boundaries that provide the opportunity for the really interesting observations of complexity (Allen, et al., 1999). Measuring multiple levels of organization with only one scale of differentiation means the data for some levels may be lost 'in the cacophony of all the others' (Allen & Hoekstra, 1991) (p. 56). [8]

The implication for the study of 'thought-ecologies' concerns the primary effects of selection error in terms of methodological appropriateness. These effects include *exclusion*, *negation* and *obscuration*. Exclusion moves phenomena of significance outside of the observational frame. Negation includes the phenomena within the frame yet discounts its relevance. Obscuration makes observations at a resolution sufficiently imprecise so as to obscure existence (Allen & Hoekstra, 1991). While each assertion of observation is correct for its own scope of interpretation, the result of each observer-based distortion is a form of gross simplification. In these forgivable errors we become the architects of our own unfortunate ignorance. This close relationship, between the choice of methodology and the effect of scaling error, was also directly described by Vickers (Vickers, 1983b):

> We must decide what relations are all grouped together for attention for the particular purpose we have in mind and over what time span we will examine them; but if we choose wrongly for our purpose, omitting some variable essential to the behaviour we are observing or including too much irrelevance, we shall learn nothing from our study except (perhaps) our mistake. (p. 120)

In the ecology of thought, the measures we choose individually provide data that confirms (or confounds) our own pre-perceptions. This serves the self specifically, yet possibly not the development of knowledge generally. For the scale that involves humanity-level observation, there comes a point at which we must accept that the phenomena of relevance is larger than our own granularity, boundary or frequency of perception can admit. For these forms of inquiry, we will only succeed by enhancing the efficacy of our observational collaborations.

Learning #3: *Methodological validity is a function of the appropriateness of observational selectivity.*

*Axiological Significance*

The fourth learning from ecology theory is found in the philosophical assumptions that inform the determinations of the phenomena of significance. This involves selection from the observations of those items valued as having particular interest. This selection of significance is often informed by a value-laden proposition where the observer exercises a choice in what is 'worthy' of attention (Ahl & Allen, 1996). Such biases are often structurally inseparable from the paradigmatic discourse, the methods used, and

motivations for knowing. In theory though, each researcher will bring their own value-laden biases to the active process of observation.

The axiological questions in the observation of complex phenomena specifically concern the identification of the intangible and value-laden qualities of the interpretation of otherwise neutral data (Creswell, 2007). Because it is difficult to see our own biases, it is useful to consider three distinctions in axiological assumptions that separately inform the choice of emphasis on the phenomenon of significance. These are: a) *aesthetical* choices, b) *ethical* choices; and c) *metaphysical* choices.

As an illustration, when an ecologist frames a research question with the aim of 'preserving ecological diversity' there is implicitly an *aesthetical* evaluation, being to 'preserve' what is presently existing because it must have value, even beauty, if not some form of utility. In the determination of 'diversity' there is an *ethical* evaluation in inclusion (and exclusion) of certain species, privileging some and demoting others in significance. In the denoting of 'ecological' there is a specification of inclusion and exclusion of spiritual significance which may include (or exclude) different domains of the *metaphysical* (Bateson, 1991).[9]

The implication for the study of thought-ecologies is that while distinct, these different axiological preferences can be indistinguishable within an unstated presumption of value. Their explicit definition makes studies of equivalent objects of focus potentially comparable by acknowledging, or removing, the filters on observer-based attributions (Ahl & Allen, 1996). Once other evaluative frames are considered this allows the bringing together of conjunctional studies of multiple values as composites.[10] As Vickers (Vickers, 1968) explains, the origins of the diversity of perceptions are found in our individual human needs that inform and frame our selections:

> But even the examples given show that it has other another constituent. What selects these, rather than other aspects of reality for our attention? What kinds of attention are bestowed on them? They are selected because they are relevant to the needs of the creatures that select them, and the kinds of attention bestowed on them are as various as the needs; these 'needs' have become immensely varied by the same process as has generated so complex a reality system. Creators of a multiple, enduring, inner world, men have become free to develop multiple, enduring interests – for example, the interests of all the sciences. (p. 197-8)

In the study of the ecology of thought we see how, while axiological bias can be self-disclosed, it cannot be negated. When we look for beauty or the important, we exclude the ugly and unimportant. In caring for something, we enact an ethic of neglect for the less important things. In experiencing sacred divinity, we mediate with the unmediated selectively. It is these forms of significance found within the systems of thought that makes the experience of being human itself significant.

Learning #4: *Values-biases drive research passion; so rather than be eliminated it is better they are owned (and then honored)*.

*Metonymic Depiction*

The fifth learning taken from ecology theory concerns the rhetorical assumptions that inform how a model of the phenomena is built, the language that is used to describe its dynamic elements, and the predictive story that this explanation seeks to portray. The role of varying depictions in systems theories raises questions of the validity and utility between different rhetorical assertions.[11]

For example, in a challenge to a 'stasis as good' view of nature, the 'adaptive cycle' has been become a defining heuristic model in panarchy theory (Holling & Gunderson, 2002). The adaptive cycle as a metonym is often seen to be deterministic in terms of its sequence of phases even though it is expressly described as '… a useful metaphor and not as a testable hypothesis' (p. 766) by its proponents (Carpenter, Walker, Anderies, & Abel, 2001). While the *phases* of changes in an adaptive cycle seem to be common occurrences, the ordered *cycle* of change is subject to many variations. This is seen in the changing patterns of adaptation to multi-scalar perturbations based on the structure of integrations (Kolasa, 2005). Consequently, the adaptive cycle is predictable, but in real-world terms, is not spatially and temporally predictive (Carpenter, Brock, & Ludwig, 2002). Consequently, our mental-model of predictability may not always accord with the unfolding reality.

What ecology theory has also found from the use of rhetorical models is that perfect science does not generate perfect predictions (Carpenter, et al., 2002). A simple model may clearly show and generate the need for new information, requiring different parameters of measurement, which alter paradigms of interpretation and eventually generate new originating questions, leading potentially to adaptive changes in the conception of responsible socio-ecological systems management (Carpenter, et al., 2002). The positive rhetorical value seen, for example, in the use of the adaptive cycle in panarchy theory is that simple models '… help evoke effective collaboration, creativity, insight and hope' and our models as depictions of meaning '… spark imagination, focus, discussion, clarify communication, and thereby contribute to collective understanding of problems and the their potential solutions.' (Carpenter, et al., 2002) (p. 173).

The implication for the study of 'systems of thought' is that the nature of our rhetorical framing, in part, is predictive of the narrative of the future reactions that form from it. Rather than the content of the narrative being instigating of the outcome, it is the nature of the narrative itself that sets the potential limitations for resulting enactments. Where we assert stability, we see continuity. We where see change, we seek variability. The narrative of action is informed by the narrative that informed the observation and depiction. The attribution of order and expectancy in narrative depictions may either confirm or disclaim a reality (and thereby close the observational loop ontologically) (Zellmer, Allen, & Kesseboehmer, 2006). The effect of this expectation of order is also considered by Vickers (Vickers, 1970):

> The resultant order, though not wholly constant, is sufficiently so through time to be recognized as a continuing system both by its enduring characteristics and by its contrast with different ecological systems to which different conditions have been given different

> but equally enduring characteristics. Ecological order is not only a resultant; it also has results. Some of them are important to men. (p. 169)

It is from this understanding that we note that the perception of order provides a basis for reliance. In our reliance (even if on change and disruption) we can compose predictive narratives that capture our imaginations, set our expectations and in doing so form the formations of thought that govern our future observations. In Bateson's own words: 'We are arrogant about what we might know tomorrow, but humble because we know so little *today*.' (Bateson, 1991)(p. 270). This acceptance suggests, not a restraint of human hubris in even attempting to know, but the exercise of a certain responsibility for humility in the description of the knowledge gained in passing it on to future 'knowers'.

Learning #5: *Through our models we make the world, and in making the world, our models then make us.*

## Apithological Observation – Five Protocols

Taking these five learnings from ecological theory and their specific implications for praxis in thought-ecologies, we can proposed five general protocols that might frame apithological choice (i.e. Learning III) in the junctures (i.e. Learning II) for the conscious selections enabling coherent apithology observations (i.e. Learning I). Describing in sequence the error avoided, the benefit gained, the protocol selected and the potential created, these are summarized as follows:

*Ontological Humility*

The assertion that an ontological observation from one discrete level constitutes the entirety of reality results in a position of *naïve realism*. By contrast, the recognition of equally valid multiple levels of ontological organization promotes meaningful ontological selection. The protocol that enables a conjunction of multiple levels of observation is to adopt an entering stance of *ontological humility*. By an approach to the question that assumes constraint and conjunction there is the potential to accept the far boundary of our own limitations.

*Epistemological Openness*

The concretization of emergent phenomena into narrow descriptions involves *entity reification*. Asserting the realness of units of analysis distinct from their observational context directly creates paradigms of restrictive self-definition. By contrast, the acceptance that multiple paradigms for the observation of near-identical entities, defined differently, might have equal validity enables paradigmatic syntony. The protocol that enables the greatest combination of knowledge is the adoption of *epistemic openness*. The paradox of primacy is resolved when each paradigm for observation, for each focal entity of construction, is seen as contributive to the wider field of perception.

*Methodological Appropriateness*

The selection errors in a methodology that cause negation, exclusion or obscuration have the direct implication of *gross simplification*. The reliability of data generated from contracted frames of reference support conclusions of specifics that are irreconcilable with more general conclusions. By contrast, the expansion of methods of observation that prevent the conflation of phenomenon from one level of observation within another level of perception enables the appreciation of emergence, change and cross-scalar dynamics. The protocol that promotes confirmation across multiple contexts of observation involves variations in *methodological appropriateness*. The recognition of selection of different modalities, for naturally different phenomena, in multiple levels of organization, in terms of multiple spatio-temporal scales, provides an unparalleled richness in the potential for comparisons.

*Axiological Reflexivity*

The interpretation of neutral data without an awareness of evaluative biases contains the risk of *values projection*. The decision for an attribution of significance that fails to recognize aesthetical, ethical and spiritual preferences requires that others must contradict any omissions. By contrast, the appreciation of personal preferences qualifies oneself to act as a highly responsive instrument with unique experience. The protocol that honors the validity of meaning is an acceptance of the privileging of the meaningful in *axiological reflexivity*. In understanding the way in which an observation reflects oneself, the act of observation provides an opportunity that 'polishes the lens' of appreciation reciprocally.

*Metonymic Responsibility*

The mental-models we hold provide the comfort of confirmation supported by *normative assertion*. When our observations have a pre-determined explanation, the question has been answered, the entity selected, the methods restricted and the evaluation conducted prior to the experience being experienced. By contrast, depictions that are seen as momentary reflections of captured expressions create a greater gallery of impressions. The protocol that reflects the understanding of how our models inform our questions is found in the acceptance of *metonymic responsibility*. Rather than the resentment of unfulfilled expectations, our narratives might begin to frame our future generative anticipations.

*Implications for Apithological Praxis*

This summary reflects something that we already know intimately. The many ways in which human knowing finds its own self-confirmation in the making of meaning reflects something in common to each of us. This in-common characteristic is, of course, our humanness. Once again, Vickers (Vickers, 1987) attends to how our humanness places significance within each study on what is meaningful to us, in terms of a human aesthetic:

> When we turn to human relations, we cross a boundary which can be ignored only by a staggering feat of mental occlusion – a feat which many scientists achieve. We know what it is to be human in a way in which we know nothing else. We credit and cannot help crediting our fellows with feelings and capacities similar to our own; if we did not, a

> large and crucial part of our vocabulary would lose its meaning. The study of men by man differs from their study of any other possible object of their attention in ways which are radical and inescapable; for the schemata by which we organize our experience of them is built up in part from our own experience of being human. (p. 65)

It is this human approach to being human and accepting that in the process of humanity-level perceptions we err selectively that informs and drives an apithological approach to human systems observation.

**Observations on Observing**

This inquiry begins from the premise that protocols for the observation of complex systems of human thought were needed and were not known. To investigate what a generative approach to the systemic study of the phenomena of human meaning might involve, benefit was derived from insights gained in the observation of other complex naturally occurring systems. The use of five junctures in observational choice in ecological hierarchy theory provides punctuations for the conscious selections that enable 'mindfulness of the observing mind'. The application of five learnings from an established discipline enables deutero-learning and the formation of observational principles in a newly emergent paradigm. The result is five propositions for the protocols that apply to philosophically coherent apithological observations. This process is summarized in Appendix A.

In completing this exercise one further recognition and insight occurred. The set of Learning II choices thus enacted reflect their own character in terms of being either contractive (i.e. pathological) or generative (i.e. apithological) as observational combinations. These sets of contexts potentially have a compounding effect on the ecology of thought for any observation. While the potential exists for multiple permutations of the presence or absence of any of the five observational errors, one proposition is that all contraction errors have a relational and systemic effect on the other specified dimensions. This ultimately may have a third-order cybernetic effect on the capacity for observation itself.[12]

A comparison of scenarios demonstrates the respective contributions of generative and contractive systemic feedbacks and their cumulative cybernetic effects:

> *Contractive Learning*: An observation based in *naïve realism* conflates multiple levels of observations forming a confused description. This is compounded by the *entity reification* of a complex phenomenon into a non-representative unit of observation. To negate anomaly and confine the resulting ambiguities, observational frequency is further limited by *gross simplification*. The selection of significance from the reduced data set is used to support value-laden propositions as universalized *values-projections*. These assertions justify an unverifiable predictive model representing a *normative assertion*. This creates a new problem scenario for ontological fixation, compounding the self-affirming focus of the initial observation (see Figure 1.1).

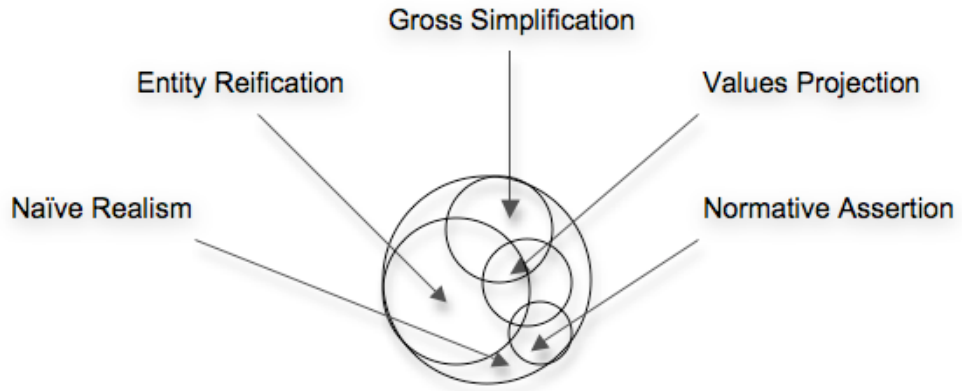


**Figure 1.1 – Contractive Scenario**

*Generative Learning*: An observation based in *ontological humility* examines phenomena at a level of observation situated between levels of organization. In *epistemic openness* the definition of the unit of observation is based on relations of unknowing, such that explanation is derived from investigation. The framing of information gathering is derived from *methodological appropriateness* where the phenomena occurring determines the specifics of observations. The data analysis engenders *axiological reflexivity* where what is revealed alters the observer's own assumptions of value. The descriptive account involves *metonymic responsibility* with recognitions of difference enabling changes in fundamental assumptions. This inspires the humility of investigation and the framing of the subsequent open question (see Figure 1.2).

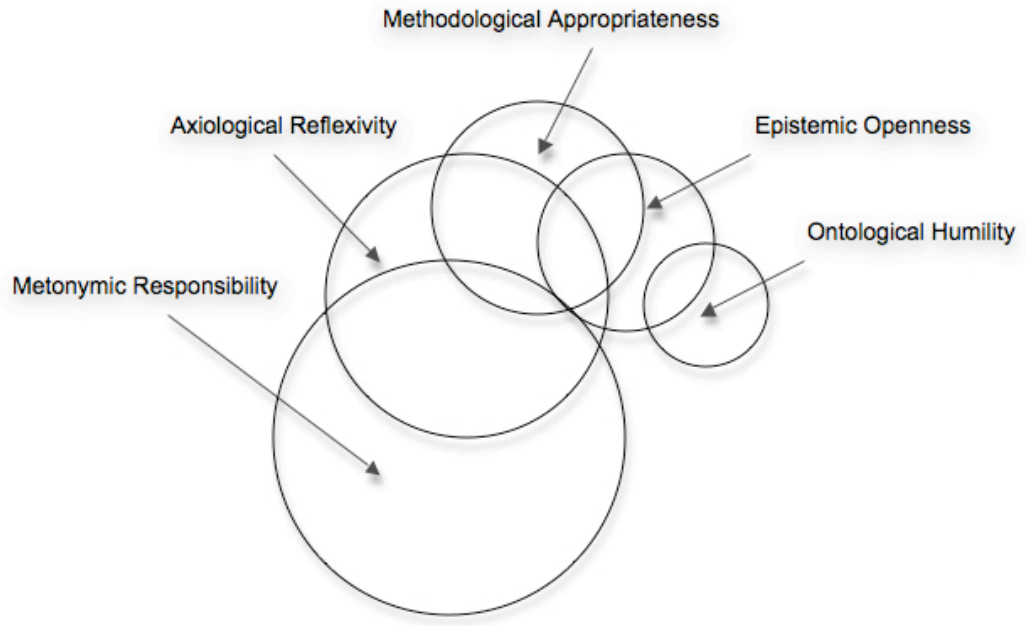


**Figure 1.2 – Generative Scenario**

The interesting proposition is how the impacts of one error in selection will compound the effects of doubt and uncertainty in future selections. While not impacting the efficacy of that single observation made on its own terms, this impacts the prospect for future generative constructions. This compounding effect would result, over time, in a systemic 'closing-down' of thought to new understandings. This proposition must, in theory, also evoke a counterpart proposition of equal validity. The tendency to select a generative inquiry, in coherence, will theoretically compound and enhance the future capacity for our opening into unknowing (Varey, 2009).

The possible effects on humanity's capacity of a sustained praxis of *generative* choice within vibrant thought-ecologies is, at this stage, something only imaginable through the anecdotal evidence of our own cherished generative learning experiences. For confirmation of observations of the effect of this inquiry at a humanity-level (i.e. Learning IV), we will need different paradigms and processes to guide us. It is to this end that apithology as a paradigm of inquiry is ultimately directed.

## Conclusion

In this discourse we can identify that a recognition of errors in choices of epistemology (Learning I), enable a reconsideration of those choices within a defined set of alternatives (Learning II), which leads to the potential for changing the nature of choice in that systemic set (Learning III). In the intergenerational alteration of approaches to the epistemology of learning there is at least the prospect of combinations in 'phylogenesis and ontogenesis' (Bateson, 1972) for benefits outside of our lifetimes and individual genetics (Learning IV). The exercise of Learning III choices sets the Learning IV potentials.

We can also appreciate the ethics of generative learning may involve a confrontation to present self-affirmations. A change in direction begins only with individual actions in a context of conducive conditions. The recognition from this analysis is that part of that shift in direction begins with the conscious act of observational selection.[13] In this, it is for each researcher to find the orientation of their own primary motivations – as the generative and contractive are equally available human potentials (Maslow, 1996).

This clear distinction, made theoretically, is perhaps illustrated most dramatically, not by a cybernetic diagram of delayed effects, but instead by being emotionally 'felt' through the evocative summary that concludes Bateson's (Bateson, 1972) own analysis of generative dynamics:

> We have got to be like those few scientists who work with this urgent sort of inspiration, the urgency that comes from feeling that great discovery, the answer to all our problems, or great creation, the perfect sonnet, is always only just beyond our reach, or like the mother of a child who feels that, provided she pay constant enough attention, there is a real hope that her child may be that infinitely rare phenomenon, a great and happy person. (p. 149)

This sentiment introduces this paper's conclusion. An apithological philosophy to be relevant must be more than philosophically coherent, it must also be willing to be philosophically generative. To open to unknowing requires more than the desire for a coherency of location, definition, description, evaluation and prediction (i.e. reflecting the five domain choices). It also requires the appreciative mind of contribution, by the act in itself, to curate the richness of the ecology of thought.

.

**Apithological Systems Theory: Learnings from Ecology**

| **Philosophical Domain** | **Ecological Theory** | **Apithological Theory** | **Assumptive Bias** | **Apithology Paradigm** |
|---|---|---|---|---|
| Ontology – Asking the Research Question (Deciding what to look for) | Privileging of a empirical, definitional or experiential hierarchy in claims of ontological supremacy to conflate complexities. | The use of conjunctional ontologies, recognizing that phenomena occurs in multi-scalar systems of complex organization. | *Naïve Realism* – What is perceived or perceivable by the first-person observer constitutes the entirety of reality. | *Ontological Humility* – The recognition that a conjunction of ontological preferences reveals facets of multiple realities. |
| Epistemology – Definition of Entity (Selecting unit of inquiry and paradigm of disclosure) | Arbitrary selection of criteria for observation of entities for inquiry through pre-existing paradigmatic biases irrespective of the actual phenomena. | The recognition that the focal entity and the related locus of observation appear differently in each level of observation and paradigm of inquiry. | *Entity Reification* – The phenomena of perception is existent, as verified by one paradigm of observation that neglects any levels conflation. | *Epistemic Openness* – The assumption that different objects of conceptual construction are engaged with best by their own paradigm of perception. |
| Methodology – Measurement Choices (Decisions on grain, extent, frequency) | Limitations of the boundary of perception within narrow protocols for observation to derive contextless and simplistic observations. | The assumption that the limits of an inquiry are open to the limits of perception, not the convenience of data selection. | *Gross Simplification* – Through the effects of sampling choices, by negation and exclusion one can assert simplistic explanations of causation from narrow observations. | *Methodological Appropriateness* – The understanding that phenomena has spatial and temporal characteristics and limits independent of the mode of observation. |
| Axiology – Noticing Phenomena (Attributing significance and relevance) | Using pre-formed filters of significance to allocate emphasis to value-laden criteria excluding what is outside aesthetic, moral or accessible assumptions. | The respect of aesthetic specialization and recognizing the unique ability of the researcher in discerning features of specific phenomena. | *Values Projection* – The confusion of one's history, capacity and accessibility of interpretations with the act of impartial noticing and describing. | *Axiological Reflexivity* – The acceptance that what the research reveals is the researcher, so to uniquely use the self as an instrument of disclosure. |
| Metonymy – Evaluating Models (Narrative story told and predictions) | Reliance on the assumed model of understood behavior to pre-describe phenomena without allowing for variations. | The formation of comparative heuristics as useful snapshot models to notice continuously changing difference. | *Normative Assertion* – When the narrative or model form usually used is promoted over the actual evidentiary data. | *Metonymic Responsibility* – The acceptance that past description alters each new recognition and so affects ontological assumptions. |

**Annexure A**: This table is a summary of: 1. the domains of coherence in philosophical assumptions; 2. the primary learnings from ecological hierarchy theory; 3. the assumptions and intentions of an apithological inquiry, 4. the habitual categories of observational error; and 5. the apithology protocols for a generative inquiry. From the body of the paper these are referred to respectively as the: *1. Five Domains, 2. Five Learnings, 3. Five Implications, 4. Five Errors,* and the *5. Five Protocols.*

## REFERENCES


Ahl, V., & Allen, T. F. H. (1996). *Hierarchy theory: A vision, vocabulary, and epistemology*. New York: Columbia University Press.

Allen, T. F. H. (2008). Scale and type: A requirement for addressing complexity with dynamical quality. In D. Waltner-Toews, J. J. Kay & N. M. Lister (Eds.), *The ecosystem approach: Complexity, uncertainty, and managing for sustainability*. New York: Columbia University Press

Allen, T. F. H., & Hoekstra, T. W. (1991). Role of heterogeneity in scaling of ecological systems under analysis. In J. Kolasa & S. T. A. Pickett (Eds.), *Ecological heterogenity* (pp. 47-68). New York: Springer-Verlag.

Allen, T. F. H., & Hoekstra, T. W. (1992). *Toward a unified ecology*. New York: Columbia University Press.

Allen, T. F. H., O' Neill, R. V., & Hoekstra, T. W. (1999). Interlevel relations in ecological research and management: Some working prinicples from hierarchy theory. In S. I. Dodson, T. F. H. Allen, S. R. Carpenter, K. Elliot, A. R. Ives, R. L. Jeanne, J. F. Kitchell, N. E. Langston & M. G. Turner (Eds.), *Readings in ecology* (pp. 393-412). New York: Oxford University Press.

Allen, T. F. H., & Starr, T. B. (1982). *Hierarchy, perspectives for ecological complexity*. Chicago: University of Chicago Press.

Allen, T. F. H., Tainter, J. A., & Hoekstra, T. W. (2003). *Supply-side sustainability*. New York: Columbia University Press.

Bateson, G. (1972). *Steps to an ecology of mind*. San Francisco: Chandler Publishing Company.

Bateson, G. (1979). *Mind and nature: A necessary unity*. New York: Dutton.

Bateson, G. (1991). *A sacred unity: Further steps to an ecology of mind*. San Francisco: Harper Collins

Bateson, G., & Bateson, M. C. (2005). *Angels fear: Towards an epistemology of the sacred*. Cresskill, NJ: Hampton Press.

Berkes, F. (2008). *Sacred Ecology* (2nd ed.). New York: Routledge.

Carpenter, S. R., Brock, W. A., & Ludwig, D. (2002). Collapse, learning, and renewal. In L. H. Gunderson & C. S. Holling (Eds.), *Panarchy: Understanding transformations in human and natural systems* (pp. 173-193). Washington, DC: Island Press.

Carpenter, S. R., Walker, B., Anderies, J. M., & Abel, N. (2001). From metaphor to measurement: Resilience of what to what? *Ecosystems, 4*, 765-781.

Cook-Greuter, S. R. (1990). Maps for living: Ego development stages from symbiosis to conscious universal embeddedness. In M. L. Commons, F. A. Richards, C. Armon & L. Kohlberg (Eds.), *Adult Development: models and methods in the study of adolescent and adult thought* (Vol. 2, pp. 79-104). New York: Praeger.

Cook-Greuter, S. R. (2000). Mature ego development: A gateway to ego-transcendence *Journal of Adult Development, 7*(4), 227-240.

Cook-Greuter, S. R. (2004). Making the case for a developmental perspective. *Industrial and Commercial Training, 36*(6/7), 275-281.

Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Denzin, N. K., & Lincoln, Y. S. (2003). *Strategies of qualitative inquiry* (2nd ed.). Thousand Oaks, CA: Sage.

Fischer, K. W., Hand, H. H., & Russel, S. (1984). The development of abstractions in adolescence and adulthood. In M. L. Commons, F. A. Richards & C. Armon (Eds.), *Beyond formal operations* (pp. 43-73). New York: Praeger.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 105-117). Thousand Oaks, CA: Sage.

Haack, S. (1993). *Evidence and inquiry: Towards reconstruction in epistemology*. Oxford: Blackwell.

Heron, J. (1996). *Co-operative inquiry: Research into the human condition*. Thousand Oaks, CA: Sage Publications.

Holling, C. S., & Gunderson, L. H. (2002). Resilience and adaptive cycles. In L. H. Gunderson & C. S. Holling (Eds.), *Panarchy: Understanding transformations in human and natural systems* (pp. 25-62). Washington, D.C.: Island Press.

Kaplan, A. (1964). *The conduct of inquiry: Methodology for behavioral science*. New York: Chandler.

Kolasa, J. (2005). Complexity, system integration, and susceptibility to change: Biodiversity connection. *Ecological Complexity, 2*, 431-442.

Kolasa, J., & Rollo, C. D. (1991). Introduction: The heterogenity of heterogenity: A glossary. In J. Kolasa & S. T. A. Pickett (Eds.), *Ecological heterogenity*. New York: Springer-Verlag.

Korzybski, A. (1958). *Science and sanity: An introduction to non-Aristotelian systems and general semantics* (4th ed.). Lakeville, Conn. USA: Institute of General Semantics.

Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago: University of Chicago Press.

Lincoln, Y. S., & Guba, E. G. (2000). Paradigmatic controversies, contradications, and emerging confluences. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitiative research* (2nd ed., pp. 163-188). London: Sage Publications.

Maslow, A. (1996). *Future visions: The unpublished papers of Abraham Maslow*. Thousand Oaks, USA: Sage Publications.

Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. W. I. (1972). *The limits to growth: A report for the Club of Rome's project on the predicament of mankind*. New York: Universe Books.

Meadows, D. H., Randers, J., & Meadows, D. L. (2004). *Limits to growth: The 30-year update*. White River Junction, Vermont: Chelsea Green Publishing Company.

Popper, K. (1983). *Realism and the aim of science*. Totowa, NJ: Rowman and Littlefield.

Reason, P. (1988). *Human inquiry in action: Developments in new paradigm research*. London: Sage.

Torbert, W. (2004). *Action inquiry: The secret of timely and transforming leadership*. San Francisco, CA: Berrett-Koehler Publishers.

Travis, J. (2006). Is It what we know or who we know? Choice of organism and robustness of inference in ecology and evolutionary biology. [American Society of Naturalists Presidential Address]. *The American Naturalist, 167*(3), 303-314.

Varey, W. (2008). Apithology: An Emergent Continuum. *Aspects of Apithology: Journal of Apithological Practice, 1*(1), 1-7.

Varey, W. (2009). Opening to Unknowing: The Epistemology of Apithology. *Aspects of Apithology: Journal of Apithological Practice, 2*(5), 1-10.

Varey, W. (2010). *Psychological panarchy: Steps to an ecology of thought*. Paper presented at the 54th Meeting of the International Society for the Systems Sciences (17-23 July 2010), Waterloo, Ontario.

Vickers, G. (1968). *Values systems and social process*. Harmondsworth, Middlesex, England: Penguin Books.

Vickers, G. (1970). *Freedom in a rocking boat: Changing values in an unstable society*. Harmondsworth, Middlesex, England: Penguin Books.

Vickers, G. (1978). Appreciative Systems (Parts I-IV). On *Systems practice: Managing complexity* [Transcript: Video Interview]: BBC Open University

Vickers, G. (1983a). *Human systems are different*. London: Harper & Row.

Vickers, G. (1983b). *The art of judgment: A study of policy making*. London: Harper & Row.

Vickers, G. (1987). *Policymaking, communication, and social learning: Essays of Sir Geoffrey Vickers*. New Brunswick, NJ: Transaction Inc.

Visser, M. (2003). Gregory Bateson on deutero-learning and double bind: A brief conceptual history. *Journal of History of the Behavioral Sciences, 39*(3), 269-278.

Visser, M. (2007). Deutero-learning in organizations: A review and a reformulation. *Academy of Management Review, 32*(2), 659-667.

Zellmer, A. J., Allen, T. F. H., & Kesseboehmer, K. (2006). The nature of ecological complexity: A protocol for building the narrative. *Ecological Complexity, 3*(3), 171-182.

## Endnotes:

[1] The lineage of the work of Sir Geoffrey Vickers is privileged in this paper for its novel perspective of bringing psychological criteria into a systemic analysis. Its specific relevance to this research is in providing one example of how to approach the formation of social policy ecologically *and* humanistically. In this work there is a refutation of one criticism of the behavioral and systems sciences, being that reifications of human (and living) systems often involve negations of the role of our thinking agency. The emphasis on humanistic aims when depicting 'thought' provides one counter-argument to this assertion.

[2] For example, from macro-level human sustainability perspective, a Learning 0 response to the shock of material shortages (e.g. oil, iron ore, uranium) might be to acquire more materials (i.e. increase production). If there is an increasing recurrence of shortages, a Learning I response might be technological innovation to accelerate response repetition (e.g. an increase in rates of extraction). A Learning II response involves transferring the learning of modes of increased extraction to other situations, seen in the human innovation of globalised technological progress (e.g. non-renewable resource exploitation). The recognition of the error in Learning II enables a Learning III response (e.g. sustainable development) to continue that progress. We might also recognize that each of these forms of learning have the same quality of solution (i.e. Learning IV) reflecting the psychological phylogeny of the solver (e.g. humanity as a (sometimes) self-monitoring consumer).

[3] One solution to the limitation of Learning II is the possibility for transformation of the learning by changing the learner (i.e. Learning III). At an individual level this involves a transformation of cognitive structures, systems of belief and even self-identity. Bateson (Bateson, 1972) identifies this strategy as potentially an unreasonable request, being pathogenic to some men and animals. A Learning III change at the societal level (depending on the psychodynamic capacities for learning and change operating) may be actively pathogenic to human social systems. In an evolutionary sense, transformation can involve adaptation by deconstruction beyond our capabilities for reconstruction. The reactive arguments for transformational learning as a form of meta-learning in recursion often neglect this understanding.

[4] It is useful to note a distinction between 'deutero-learning' in Bateson's original usage (relating to learning about context-learnings) and 'meta-learning' which occurs as single and double-loop learning for error detection in specific contexts (which might include changing cultural norms) (Visser, 2007). Because deutero-learning involves 'adaptations that may range from healthy to pathological' (Visser, 2007) (p. 662) the step needed prior to enabling generative trito-learning (i.e. Learning III) is error correction in deutero-learning contexts. Hence this paper represents a meta-learning approach to deutero-learning. Simply, this is an apithological approach to learning about apithology. The result is a process of generative learning reflecting the principles of 'apithagogy' (i.e. learning about the teaching of generative learning techniques).

[5] Lincoln and Guba (Lincoln & Guba, 2000) revisit their original categorizations in an axiomatic approach to the positivist, post-positivist, critical theory and constructivist paradigms, later recognizing the emergent paradigm of participatory inquiry and also the requisite importance of axiological posture as a distinct category of the metaphysical components of those paradigms.

[6] Because the rhetorical dimension of philosophical coherence often involves more than oratory, it is proposed that a better classification of the fifth domain of the '*rhetorical*' for the systems sciences is provided by the term 'metonymy'. A metonym is essentially the substitution of an attribute of a thing for the thing itself. In describing the data by its attributes or a narrative model, we seek to represent the entirety of observable phenomena directly by indirect and symbolic means. The role of metonymy is described by Lakoff and Johnson (Lakoff & Johnson, 1980) as having a referential function, where one entity is used to *stand* for another and is distinguished from a metaphor, where one entity is used to *conceive* of another. In the philosophical domain of metonymical choice the observer decides how to re-represent the observed phenomena within a narrative description, in a hearsay account that (through its cogency) is claimed to have validity and authenticity.

[7] The conflation error in naïve realism becomes most clear when considering the capacity for complexity of the observer (Fischer, Hand, & Russel, 1984). In developmental psychology, the studies testing for stages of cognitive complexity reveal multiple frames of observation to be empirically existent (Cook-Greuter, 1990, 2000, 2004). However, as most of these are experientially unfamiliar, the naïve realist observer is theoretically unaware of the need to include these conceptual categories in their observational alternatives. In conceptual systems, the ontological frame of the observer is often asserted to be the only frame of reference ontologically possible (whereas in fact it is only the maximum frame available). While these potential frames are clearly defined, our own perceptions are quite naturally confined.

[8] In the comparison of ecological studies from different locations and with different composition, one method is to make the scale of observations compatible to 'some reference phenomenon of ecological significance' (e.g. fire as disturbance or stock grazing pressure) (Allen & Hoekstra, 1991) (p. 65). Scale is then determined and adjusted for each data location based on the 'reference phenomena' of significance, rather than relying for validity on the features of scale unique to the heterogeneity of any single location of observation. Because the common feature of human systems is our 'human-ness', the humanity-level comparison of systems of thought is in theory similarly possible.

[9] A practical example from ecological research is the inclusion of various forms of phenomenon in a sacred ecology, some being of primary significance and pervasive in the experience of other peoples, yet empirically inaccessible to the researcher personally (Berkes, 2008).

[10] Ahl and Allen (Ahl & Allen, 1996) characterize axiological observations as analogous to a perturbation of 'a web of belief'. They describe how phenomena may be kept and wrapped (a discovery), worked around (maintenance), or suppressed as anomaly and ignored. This (ungenerously and ingeniously) makes 'us' the observer scientists into hapless waiting spiders, each being '… a member of a particular species (discipline), working within a specific framework (this web of belief), and striving towards a particular goal (sustaining self and discipline)' (Ahl & Allen, 1996) (p. 43). For those with only one paradigm and one method of inquiry, this metaphorical attribution of arachnidal polyocularism is perhaps to be taken as a compliment, suggesting forms of imagined perception beyond even our most inspired observations.

[11] A famous example of this is the landmark sustainability report on the *Limits to Growth* together with its thirty-year update (Meadows, Meadows, Randers, & Behrens, 1972; Meadows, Randers, & Meadows, 2004) Their systems modeling graphically introduced and portrayed the narrative concepts of 'overshoot', 'exponential growth', 'finite worlds', 'sustainability transitions', 'pollution sinks' and 'renewable sources' to challenge world-wide economic assumptions of limitless potential. This example highlights how predictive assertions of continuous growth based on models from data from one strata of observation with limited timeframes have limited validity in complex hierarchical systems of multiple demands, feedbacks and limitations. A metonymic alternative can begin a refocusing of even long-held ontological assumptions.

[12] This proposition is similar to (and has a relationship with) Bateson's concept of 'pathological deutero-learning' (Visser, 2003) (i.e. the double-bind) except that, rather than describe a relational dynamic in the contradictory messages between levels of learning for an individual thinker, this proposition relates to the potentials of cross-scalar effects in levels of organization in thought. The phenomena for observation is of a different order (although the ultimate effects may potentially be similar).

[13] While it is natural to personalize the errors of learning, the proposition of this paper is that, although choices for error correction can be exercised personally by strength of individual will, the errors themselves are not individually attributable. Bateson (Bateson, 1972) notes that, in proposing a new conceptual frame for the consideration of learning: 'In a word, schizophrenia, deutero-learning and the double bind cease to be matters of individual psychology and become part of the ecology of ideas in systems or 'minds' whose boundaries no longer coincide with the skins of the participant individuals.' (p. 310). This is why the answers sought by this research represent innovations in systems theory not easily found in the domain of traditional psychology.