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Facilitating eco-logical futures through postformal poetic ecosophy

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ABSTRACT

A perspective is given regarding global mindset change: two key interrelated features underlying late modernity – economism and modern atomism – are critically contrasted with three key interrelated features underlying prospective "eco-logical" futures, namely, ecosophy, postformal thinking, and poetics. From a transdisciplinary or complex-integrative perspective, both economism and modern atomism are identified as suffering "economies of truth" whilst postformal poetic ecosophy is identified as involving "complexities of truth" – a better fit for an eco-logical future. The desirability of the following hierarchies is indicated: that the archetype of economy be aptly embraced by ecosophy, formal by postformal, and prosaics by poetics.

1. Introduction: passion for the possible

It is hard to imagine a bottom line more significant than the destruction of Earth's biosphere, one which hosts an extraordinary beauty of lifeforms including we *homo sapiens* and the myriad bedazzlements of our economic machine. Yet in the late industrial era – for the first time in the planet's history – such destruction is now possible. Additionally, global economic inequality is accelerating whilst a variety of malaises upset the psychological well-being of many. The world seems to be crying out for global mindset change capable of facilitating a future preferable to the nihilistic endgame of business-as-usual [1–4]. Such a transdisciplinary quest can be approached through a rich interpretation of Ernest Boyer's *scholarship of integration* countering the current overextensions of the agendas of neoliberal economics and atomist-empiricist social science [5–8].

This paper briefly outlines two key interrelated features underlying the dominant global mindset – namely, economism and modern atomism – and contrasts these with three key interrelated features underlying prospective "eco-logical"[1] futures, namely, ecosophy, postformal thinking and poetics (complexly cohered as "postformal poetic ecosophy"[2]). The approach is aligned to Causal Layered Analysis whereby metaphoric templates are understood as underlying worldviews which in turn underlay policy and litany layers [12].[3] The potential generativity of addressing metaphoric templates is indicated in Fig. 1.

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[1] In addition to the current usage, the term *eco-logic* is sometimes used to refer to that which pertains to environmental ecology (e.g. [9,10]), and sometimes to socio-cultural phenomena [11].

[2] "Postformal poetic ecosophy" may be used as shorthand for the hyphenated (and process-oriented) "postformal-poetic-ecosophical." Although the latter more accurately indicates the comparable status of each term and the complexity of their relationships, the foregrounding of *ecosophy* in the unhyphenated amalgam accords with the importance of the current ecological crisis. Furthermore, through unity-in-diversity, the three terms should be understood as implying both singular and plural possibilities.

[3] From one perspective, modern atomism and economism (among others) can be seen as metaphoric templates underlying the late modern worldview, whilst from another perspective, modern atomism can be seen as underlying an economist worldview (which itself pertains to the modern worldview); postformal poetic ecosophy may similarly ("fuzzily") be understood as (a) template(s) prospectively underlying (an) eco-logical worldview(s).

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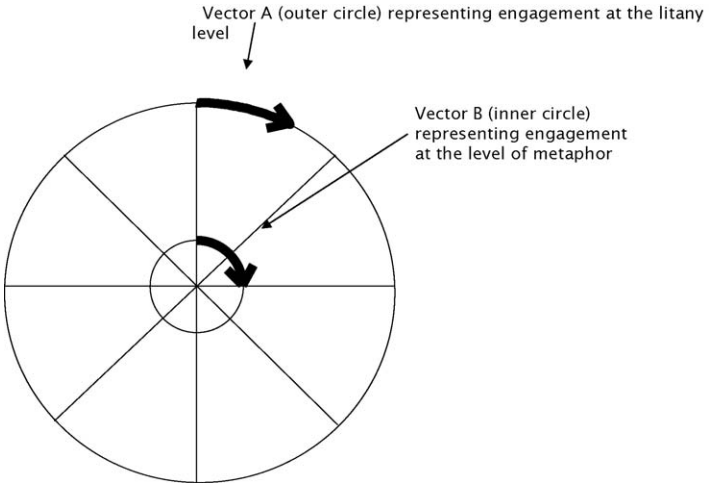

Fig. 1. The outermost and innermost layers of Causal Layered Analysis configured as concentric circles suggesting the efficacy of changing metaphors in relation to the same effort being applied at the litany level (a greater angle or circle sector is accomplished).

Both economism and modern atomism pertain to the undue influence of the principle of *economy* – through *economics* and *economies (or contractions) of truth* respectively. In contrast, postformal poetic ecosophy comprises *complexities of truth*, a paradigmatic vector more fitting for eco-logical futures. Modern atomism – the privileging of explanation through simple, homogenous units – can be understood as a metaphoric template underlying formal thinking, and can lead to such imbalances as technicism, disciplinism, and prosaicism as described below. Through such concepts as *utility*, modern atomism also underpins classical/neoliberal economics[4] and thus also economism – the undue influence of economics in theory and/or practice [14,15]. From an integrative, "big picture" or transdisciplinary perspective, modern atomism can be understood as an undue partiality or reduction, insufficiently attentive to complexity, multidimensionality or Gestalt considerations. The theoretical intention is not to critique the terrains of *atom*, *formal thinking*, *economics*, *technology*, or *prosaics*[5] per se, but rather to critique their overapplication or misconfiguration. The global economic machine operates as if it is insufficiently aware that the planetary "organism" which hosts it might die – surely a wanton short-sightedness, a potentially fatal economy of truth.

In contrast to modern atomism and economism sit ecosophy, postformal thinking and poetics – broad and somewhat open domains, able to act as semantic "strange attractors" that resist wholly technicist interpretations. Such balance between semantic solidity and openness accords with the new paradigm(s) they indicate. In brief, ecosophy refers to Felix Guattari's three ecological registers of environment, human culture and psychology; it also refers to Arne Naess' understanding regarding personal orientations toward deep ecology [17,18]. In psychology, postformal thought refers to developmental levels beyond Piaget's formal operations; whilst from education, it refers[6] to the socio-cognitive expression of postmodernity [20–26]. Poetics identifies the art in phenomena by way of an open conceptual system. As such, it embraces such notions as artfulness, liminality, and ontological meaning [27–33]. Lastly, the term *eco-logical* points not only to an environmentally sustainable future but to the metaphoric logic *of* ecology: ecologies of mind dialogic consciousness, multivalent logics, etc. [34–37]. Additionally, the normativity of eco-logics points to well-being in relation to human individuals, society and non-human life.

It is possible that the severity of the ecological crisis will lead to a revolution involving a change from late modernity's *economic* fundamentalism to an *environmental* fundamentalism, a revolution perhaps akin to modernity's reaction against medieval *religious* fundamentalism. In this "fundamentalist relay" scenario, the survival of humanity and the biosphere as a whole could perhaps be attempted through the quasi-totalitarian structures. But is this the best that could be imagined? Postformal poetic ecosophy suggests not: it seeks to counter the complexity reduction associated with fundamentalism and the totalitarian mindset [38]. Indeed, the three-term amalgam inhibits the potential fundamentalisation of any of the three individual terms.[7] Rather, postformal poetic ecosophy – somewhat resembling Gidley's *postformal-integral-planetary* [19] – more easily maintains "buoyancy" through resisting a foundational centre. Each term is variously capable of embracing the

[4] Neo-liberalism goes beyond classical economics (with its assertion regarding economics as a "natural" domain) in that it asserts that the free market *must be actively supported* by the government (and thus not left to "nature") [13].

[5] Indeed, a case can be made for the valorisation of prosaics against complacent interpretations of poetics [16].

[6] It can also refer to alternatives to the formal, factory model of education [19].

[7] Including such fundamentalisations as postformal thought imbued with insufficient indeterminacy, poetics as involving analysis through the template of a closed theory or system, or ecosophy as environmental fundamentalism.

other two via an abundance of potential interrelationships (that are beyond the scope of this paper to explore). A key coherence is that postformal poetic ecosophy seeks to harness "passion for the possible" [39, p. 174].

2. Economies of truth

2.1. Economism

Economism[8] can be understood as the undue influence of economics – whether in theory or practice. Regarding *theoretical* domination, it assumes that "the economy is everything, and that mainstream economic theory is true" [40, p. 89]. Underpinned by modern atomistic thinking – including contracted and biased forms of individualism [41,42] – economism can be understood as a modern worldview, currently somewhat conterminous with the ideology of economic globalisation – see, e.g. [43]. Regarding *practice*, at the policy level it refers to an overemphasis on economic dimensions at the expense of social policies. The litany level is similarly affected: for instance, a casual glance at the newspaper on the day of writing, reporting on the world economic recession refers to a "deteriorating world outlook" [44, p. 1] implicitly equating the entire "world" with the economy. Which world is deteriorating? Which ideology is speaking?

Ominously, even Adam Smith, "father of modern economics," foresaw the dangers of economism or "unbridled capitalism" in the 18th century [45,46]. Despite its rhetorical face, the current neoliberal economic agenda can be seen as *ill*iberal to the extent that the role of human agency is held as less important than that of the market or of technology [43]. It can be understood in relation to numerous "economies of truth" such as those pertaining to identities of human, polity, corporations, and value. With regard to the human species, mainstream economics purports to treat the construct *homo economicus* as a hypothesis, yet in practice employs it as a "taken for granted... obvious truth" [47, p. 3]. This ignores alternative imaginaries regarding our species such as *homo aestheticus*, *homo cogitans*, *homo complexus*, *homo faber*, *homo ludens*, *homo poeticus*, *homo politicus,* or *homo socians* [48–50]. Such an ecology of identifications rather points to a far more complex situation than mainstream economics would have us believe – a fecundity surely "responsible for human openness and adaptability" [51, p. 289].

The undue privileging of economic aspects of society over physical, biological, political and cultural dimensions has many repercussions. For example, social interactions are reduced to a single type, namely *trade* – a situation "bound to produce only trivial results" [40, p. 89] as trade "is neither a strong nor a lasting bond – not even in the business world" [40, p. 89], thus mitigating against meaningful social futures. Indeed, even in economic transactions, acquaintanceship *complexities* tend to be required [40]. Moreover, rather than understanding society as a complex adaptive system open to environment, politics, culture and psyche, economism imagines the entire social system as ultimately static, one unable to appreciate the value in *dis*equilibria required for, "the trial and diffusion of unorthodox ideas and practices" [40, p. 89]. (Paradoxically, this closure stands in contrast to the mythology of ever-expanding *material* production and consumption.) It is perhaps not surprising, then, that economism is associated with "restrictions to democracy" [52, p. 23]; indeed, the neoliberal agenda is often achieved through undemocratic, military means [43]. Even the identities of corporations are tainted: sociological and micro-political analyses are ignored in favour of "black-box" approaches to organisations and "faceless" identifications of individuals [40]. Furthermore, the notion of a "self-regulating market" can be identified as an economy of truth, one riding roughshod over the fact that "the workings of the market are also planned and controlled, either by states or by other bureaucratic entities such as transnational corporations" [52, p. 23]. In short,

> the economic approach to everything social homogenizes and flattens social science by reducing all social relations to exchanges, and all goods and bads to commodities, without regard to their specific functions. The approach does not and cannot work for families or clubs, schools or hospitals, scientific laboratories or artist's ateliers, churches or charities, political parties or government departments, police stations or court rooms [40, p. 89].

A significant "economy of truth" in neoclassical/neoliberal economics can be seen in the construct of *utility* and its use in utility theory. Although the idea of utility maximization was formulated in the 16th century, it was Jeremy Bentham's utilitarianism which brought utility to center stage; and it soon formed the backbone of economics [53,54]. Utility is built upon a modern atomistic template such that it is potentially quantifiable through the measurement of "utils." Whilst utilitarianism was originally used, for example, to advocate for women's rights, homosexual decriminalisation, socialism and animal rights – over time it has tended toward a certain reductionism. (This need not be the case: the importance of prioritising the address of climate change could, for example, be supported by a rich interpretation of utility.) Notably, the concept was progressively "purged of psychological reference" [54, p. 3] by neoclassical economics, and happiness became reduced to consumer choice. Since Bentham's time, the release from conservative norms has also been a *mixed* blessing in that utilitarianism had the unseen consequence of lifting the former religious ban on greediness [55]. The situation is not assisted by the tendency for utilitarian maxims "to subordinate cooperation to competition" [56, p. 36]. Arguably, its ethical heritage was severed by the rise of artificially stimulated economic demand. By the early 20th century in the U.S. for instance, production capacity had outgrown demand; demand was then artificially stimulated through marketing [55]. The emergent associated rise of corporation culture and the ideology of managerialism with its forms of accountability and non-futures-

[8] Or "economicism."

oriented "emphasis on short-term performance contracts" [57, p. 110] is also economistically implicated. Who manages well-being? Who manages the managers? How much are we undervaluing the construction and empowerment of organisations dedicated to expanding our moral, literary, scientific and mystical imaginations [58]? Such vision requires a different order than economism or the modern atomism on which it rides.

2.2. Modern atomism

Modern atomism[9] privileges explanation derived from simple, homogenous units – *atoms* – rather than complex entities. It can be regarded as an economy of truth, reducing the domain of truth legitimacies. Mathematics, the digital metaphysics of computing, and technology in general accord with modern atomism [60–62]. It also forms the basis of much modern scientific thought. Although the overapplication of mathematics can lead to a undue limitations regarding understanding [63], it would seem that the material successes of digitally-based knowledge and production – a situation catalysed by Descartes' mechanistic philosophy – has seduced us into believing that more analogical modalities are fundamentally less valuable. Yet the make-up of our cerebrum rather seems to suggest an equal legitimacy – and interaction – between the more digital left hemisphere and the more analogical right one. An analogy to such a relationship can perhaps be seen in Heidegger's discussion of *techné* and *poiesis* [64]. Modern atomism forms a key basis for the principle of *techné* which involves constructions of pre-given atomistic components (whether material or ideational/linguistic). If *techné* is regarded without non-technical context or consideration, an incomplete event occurs – it loses sight of its own *poiesis*, its own creative poetry, so to speak: techné becomes downsized, made economic; meaning is reduced, and the limitations of the actuality and metaphor of *machine* introduced. Narrow science and conventional society remain disenchanted, unable to break free of the ratio template of "small r" rationality toward more holistic understandings [65,66]. Yet "many concrete situations *even in physics, in chemistry and in engineering* are not amenable to a simple causal and experimental methodology... demographic, economic, political and social phenomena are still less understandable using only classical models" [67, p. 618] (added emphasis).

Modern atomism in the sphere of language can be termed *prosaicism* or *literalism*. This perspective states that "our natural language consists of fundamental terms characterized as atoms" [68, p. 143]. Undue value is given to the conventional, literal or "functional" over richer understandings and uses of language indicated by postmodernism's linguistic turn. Logical atomism is implicated through the notion that "propositions [can] be easily divided into those with truth values which [are] descriptive, and those that [are] ... value judgements" [54, p. 12]. In general, "ambiguity or any other sign of a lack of clarity and distinctness is understood to be nothing more than a problem that needs to be fixed through further purifications and severances" [69, p. 154]. It can be said that

> the fallacy of literalism, like the fallacy of objectivity and progress, derives from a society which can accord significance only to fact and figure, to testable unambiguous data and hard statistics [70, p. 95].

This includes the devaluing of metaphor which is often viewed negatively by many academics and administrators [71]. Yet language substantively involves the layered use of metaphor [72,73]. Indeed, "metaphorical thought is what makes abstract scientific theorizing possible" [74, p. 128].

Another form of modern atomism is the undue influence of disciplinary approaches to knowledge. Etymologically, *discipline* comes from the Latin *discipere* ("to grasp intellectually, analyze thoroughly" – literally "to take apart") via *discipulus* ("pupil") and *disciplina* ("instruction given to a disciple"). Its etymological roots are thus entwined with separation and analysis – and so somewhat kin to *science*'s root, *scindere* ("to cut, divide"). "The standard image of [the] disciplinary order is that of a universe neatly divided in a large number of only slightly overlapping areas, each one being the speciality of a particular group of professional experts" [75, pp. 23–24]. As such, disciplinism classifies both the world and its observers through "the erection of rigid boundaries" [76, p. 104] in contrast to transdisciplinary approaches. Imagining disciplines as homogenous atoms, however, is not accurate. They are decidedly heterogeneous. Additionally, their inherent fuzziness is such that "sometimes arbitrariness is involved in calling one area a 'discipline' and another an 'intersecting field.' Geography, for example, might qualify for either list, as might education and linguistics" [77, pp. 60–61]. Such reductionism can occur both *among* disciplines and *within* them. With respect to the former, bibliometrics often provide misleading accounts [78, p. 2]; with respect to the latter,

> up to the mid-twentieth century, most scientific disciplines obeyed the principle of reduction of the knowledge as a whole to knowledge of its parts, as if the organization of an entity did not produce new qualities or properties with respect to the parts taken in isolation [48, p. 35].

In general, "disciplinarian thinking seems to be unable to cope with the complexity which is overwhelming us" [79, p. 3]. Michael Finkenthal traces this back to Aristotle's understanding that disciplines sit in relation to the essential qualities of the objects of study [79]. However, a question here would be: what if the "essence" of the particular object was multifaceted and irreducibly complex? Such a possibility is enabled by postformal poetic ecosophy.

[9] Not to be conflated with ancient atomism (see [59]).

3. Toward eco-logical futures: postformal poetic ecosophy

3.1. Ecosophy

Ecosophy was coined separately by Arne Naess and Félix Guattari, about 130 years after Haeckel's 1869 identification of *ecology* [17,18]. Although Naess and Guattari did not refer to each other's usage of *ecosophy*, consideration of both interpretations together might prove generative. Etymologically, the term's root, *eco-* (also leading to *economy*) is derived from the Greek *oikos*, signifying home, household, dwelling place, habitation; whilst *-sophy* (also found in *philosophy*) comes from the Greek *sophia*, signifying wisdom.[10]

For Norwegian philosopher Arne Naess, *ecosophy* refers to particular personal orientations toward deep ecology – he labels his own orientation *Ecosophy T*: his use of the term thus points to an intrinsic pluralism [18]. He also indicates that *ecosophy* is differentiated from *ecology* partly through the former's incorporation of values. Regarding the distinction between deep ecology and shallow ecology, Naess comments:

> What characterizes the deep movement (in relation to the shallow) is not so much the *answers* that are given to "deep questions" but rather *that* "deep questions" are raised and taken seriously [81, p. 29] (original emphasis).

He notes that depth "must include not just systematic philosophical deepness, but also the 'deepness' of proposed social changes" [81, p. 22]. Naess' Ecosophy T (further) indicates the potential spiritual depth of ecosophies through his identification of the "fundamental norm" of *Self-realization*. He states both "that the higher the levels of Self-realization attained by a person, the more any further increase depends upon the Self-realization of others" [81, p. 52] and that "plants and animals also have a right to unfolding and self-realisation" [81, p. 165]. Deep ecology can be understood as a quintessential futures-oriented approach in that it has "a long-range maximal perspective of time and place" [81, p. 43], such that "any short-range solution should cover at least the next fifty years" [81, p. 17], and indeed, "a thousand years has ... to do with the problem of today" [81, p. 19]. Ecosophy can also be understood as an integrative approach in that it refers to a variously multi-leveled or hierarchical[11] "total view" [81, p. 17].

Whilst Naess's *ecosophy* foregrounds that which is commonly identified as "environment," Guattari's usage (less common in Anglophone discourse) explicitly transverses three domains [17]. Guattari explains that ecosophy is "an ethico-political articulation ... between the three ecological registers (the environment, social relations and human subjectivity)" [17, pp. 41–42].[12] These sit against a general disequilibria caused by "Integrated World Capitalism" [17, pp. 41–42]. Regarding environment, Guattari states that "if no remedy is found, the ecological disequilibrium ... will ultimately threaten the continuation of life on the planet's surface" [17, p. 27]. In relation to the socio-political domain, he identifies "Third World ... pauperisation" [17, p. 29] involving the "long-term establishment of immense zones of misery, hunger and death" [17, p. 31], now also including parts of the materially developed world. He also identifies oppressive marginalisation and unemployment, noting that "young people ... are crushed by the dominant economic relations" [17, p. 33]. Regarding the domain of the individual, he mentions such malaises as "loneliness, boredom, anxiety and neurosis" [17, p. 28] and identifies the prevalent standardization of behaviour as an "ossification" [17, p. 27]. He evaluates the whole crisis as a type of contraction and developmental regression – "a sort of general movement of implosion and regressive infantalization" [17, p. 27].

Spanning across the three domains of environment, socius and psyche a range of ecosophical features can be identified including artistry, complexity, creativity, dissensus, ethics, evolution, many-sidedness, mutuality, openness, and transversality. Guattari also explicitly *differentiates* the three domains. For instance, regarding *environmental* ecology, "anything is possible – the worst disasters or the most flexible evolutions" [17, p. 66]; *social* ecology "will consist in developing specific practices that will modify and reinvent the ways in which we live" [17, p. 34]; whilst *mental* ecology "will lead us ... [in part] to search for antidotes to mass-media and telematic standardization, the conformism of fashion, the manipulation of opinion by advertising, surveys, etc. Its ways of operating will be more like those of an artist" [17, p. 35] – in other words, a poetic sensibility is called for.

Of the three ecological registers, Guattari identifies a significant undervaluation of mental ecosophy. The construction *postformal poetic ecosophy* seeks in part to rectify this; notably, both *postformal* and *poetic* substantively address subjectivity. In addressing this domain, Guattari valorises a host of features such as *the included middle* of postformal logic, organic and ecological metaphors, "creative proliferation" [17, p. 55], the drama of multiplicity (pluralism) and the baroque.

Ecosophy encompasses the notion of sustainable futures. From another direction, it has been suggested that futures studies itself be linked to sustainability [83]; however, "sustainability does not capture adequately the essence and complexity of the ecological crisis in its various dimensions" [84, p. 665]. Ecosophy, on the other hand, *does* embrace and facilitate the required complexity, through for example the identification of "green" knowledge, the ethics of *enough*, poststructuralist political ecology and the valorization of social technologies [85–88]. It is possible, though, that "without postformal thought, the ecology movement, Gaia, and other views of the Earth are just new orthodox formal logical

[10] The archeytpe of Sophia is furthered in the spiritual-philosophical approach of sophiology found in Vladimir Sergeievich Soloviev's "Great Synthesis" of "integral reason and *sobornost* [spiritual community]" [80].

[11] Naess' embrace of hierarchical understanding adds to the problematisation of Wilber's conceptualisation of the Green developmental level (see [82]).

[12] Somewhat akin to Sasha Kegan's identification of sustainability as "the triptych of biodiversity, cultural diversity and human well-being" [this volume].

positions" [24, p. 299]: here, Jan Sinnott suggests that *postformal* perspectives are generative or even necessary to enhance ecological understandings – as indicated below.

3.2. Postformal thinking

The term *post-formal*/*postformal* can be found in three discourses, namely, developmental psychology, education and integral/integrative studies. In the first it signifies an individual developmental level or levels beyond Piaget's *formal operations*; in the second it is taken to mean *the socio-cognitive expression of postmodernism*, emphasising critical, social concerns (mostly framed non-developmentally) [26]. Regarding the third discourse, Ken Wilber, for instance, uses developmental psychology's *postformal* as a core feature of his integral theory [89] – a theory (albeit critiqued [82]) which involves a developmental schema including both individual and social dimensions; whilst Gidley's "postformal-integral-planetary" identification references psychological, educational and integral discourses [19] [also see Gidley, this volume].

Postformal researchers identify a variety of features including big-picture/contextual/integrative-thinking, complexity, creativity, dialectics, meaning/narrative, multiperspectivality, pattern-finding, problem-finding, reflexivity, and spirituality [19–26,90]. Space does not permit discussion of the potential significance and complexity of such signifiers and their interrelationships (see [82]). Nonetheless, note should be made regarding a postformal understanding of languaging such as indicated by poststructuralism's *linguistic turn*, construct-awareness, deconstruction, etymology, and metaphoric cognition [22,26,24].

Just as *formal* operations is associated with formal logic involving the law of non-contradiction [91], so *post*formal operations can be associated with postformal logics. These include fuzzy logic, probability logic, and many-valued logics (supporting multi-causality) [37,92–95] – modalities which valorise contingency and indeterminacy while rejecting the principle of a fundamentalised bivalence. Both the *incompleteness theorem* of mathematician and Platonist Kurt Gödel and the later philosophy of Ludwig Wittgenstein can be seen as lending gravitas to postformal reasoning, including apprehension of the non-mechanistic nature of mind[13] [96], effective thinking as comprising "an appropriate dialectic between the formal and the intuitive" [97, p. 372], and indeed the understanding that "one True Logic *does not exist*" [98, p. 280] (original emphasis) – for even "mathematical thinking is, and must remain, essentially creative" [99, p. 88]. Such creativity is valorised through a postformal interpretation of poetics.

3.3. Poetics

The term *poetics* stretches back to Aristotle's *Poetics* – a work mostly addressing the structural characteristics of tragedy. In modern times it has been furthered in literary studies addressing questions such as *What makes a verbal message a work of art?* and more latterly in social, political, and cultural studies [100–102]. Whilst some significations of the term are technical and narrow, poetics can be said to be "still very young" [103, p. 5] despite its classical heritage. As such, extensive interpretations of the term are possible. Indeed, poetics can be understood as "passion for the possible" [39, p. 174], an impulse "persistently push[ing] at the very edges of ... possibility" [29, p. 12]. Such an idea indicates that futures scenarios themselves (including eco-logical futures) rely on the poetic imagination. Broad identifications of poetics can also be understood as inherently transformative [104, p. 4], facilitated by processes of defamiliarization, the intensification of awareness through palpability [105,106], and a template of openness – poetics as "an open, ever-changing theoretical structure" [107 p. 14]. Poetics thus sits in accord with the complexity theory construct of *open system*, whilst contrasting the "intellectual aridity of a closed taxonomy" [101, p. 100]. Poetics identifies the art in phenomena by way of a fecund open conceptual system.

The sense of abundance in poetics contrasts markedly with the archetype of economy – whether as *frugality* or as *economics* (and its principle of scarcity). Indeed, as *the art of life*, poetics "may offer ethical resistance ... [encouraging] us to begin again, and begin to remember a life that is governed by other than instrumentalist agendas" [108, p. 1176]. It can "counter the linguistic closure that arises as a result of the occlusion by the global economic language" [29, p.39] because, for poetics, the threat of difference is not domesticated. Instead, one might – poetically – say that the reflexive wile of difference rides with a wilful wildness, a wilderness habitat rich with semantic biodiversity. Such an entwinement between poetics and ecology indicates *poetics as complex integration* whereby harmonic convergences and disharmonic divergences cohere at more embracing levels as dynamic unities.

Poetics as liminal may also be identified. At the social level, this might involve, for example, the politician, educator or researcher as poet – a liminal figure bridging hegemonic and counter-hegemonic worlds [29], even, perhaps, holding sociology as an art [109]; whilst the *transgressive* quality of poetics may surface as "a politically committed, critical social poetics" [101, p. 203] "aiming to answer the big questions and issues" [110, p. 6], perhaps an "ecological poetics" [111, p. 12] facilitating appreciation of the strange-familiar like-otherness of other species, ecosystems as earthly poems, or language as ecology; a "poetics of resistance" [112] "disrupting the smooth functioning of technology" [113, p. 12] through community-founded "poetic dwelling"; or a *poetics of transgression* apprehending the significance of "the carnival, the circus, the gypsy" [114, p. 286].

[13] Which is not to say that the mind cannot enter into a mechanistic imagination.

The poetic paradigm is most strongly configured through *poetics as ontology* wherein the Cartesian split between internal reality and external appearance is problematised [104]. Instead lies a cosmic poetry which "pulls us into *its* question, *its* repose, *its* regard" [33, p. 91], an *ontopoetics* comprising a "field-likeness" between psyche, meaning and cosmos, a perspective opening up a "world hidden within the world" such that the world, the word and ourselves may come yet more alive [31].

4. Conclusion: complexities of truth

Complexities of truth can be identified in relation to poetics, postformal thinking and ecosophy. This perspective contrasts with the economies of truth of modern atomism and economism. Economism, formalism and prosaicism each variously pertain to the modern atomistic attractor, whilst ecosophy, postformality and poetics variously comprise attractors of complexity. The term *economies of truth* indicates unacknowledged elements – hidden aspects, shadows, dialectics – and thus types of "false economy." In contrast, the idea of *complexities of truth* includes synergistic, complementary and antagonistic relations; substantive (holonic) relations between atom and Gestalt (part and whole); and multilayered schemas such that complexity does not preclude spiritual simplicity (indeed, dialectical understanding intimates as such a juxtaposition) [115,116]. Specifically, the desirability of the following hierarchies is indicated: that *the archetype of economy be aptly embraced by ecosophy, formal by postformal, and prosaics by poetics* – as outlined below.

Regarding ecosophy, *eco-nomy*, *eco-logy* and *eco-sophy* all derive from *oikos* (household, dwelling, habitat). Whereas (classical/neoliberal) *economics* – "household management" – substantively ignores the *nature* of the "house" or habitat in which the management takes place, *ecology* and (especially) *ecosophy* explicitly *include* the nature of our global dwelling. This suggests that ecology/ecosophy are more capable of aptly positioning and containing *economy* than economy is of appropriately addressing ecology/ecosophy unless economics fundamentally reworks itself to institute "household" as (at least) meaning "this planet (and its medium and long-term futures)."

Regarding *post/formal*, formal logic can be held within postformal logics; it can be held in dialectic with other cognitive modalities such as creativity, intuition, imagination and inspiration. It can also be explicitly brought into relationship with values, both in terms of uncovering those hidden in apparently neutral discourse as well as those pertaining to our preferred futures. Formal operations can similarly be held within broader contexts such as our life-narratives (at whatever scale). In short, both formal logic and formal operations are important, yet undue regard should not be given to either: larger contexts of meaning surround and infuse (our use of) these modalities.

Regarding *poetics*, from a single lifetime perspective, words are mostly already-made; yet we can still make the world afresh with the already-made – bringing new life and meaning to each word as they relay anew, narrating new understandings, new lives. Bureaucratese, clichés or non-metaphorical understandings of language may deaden our sense(s) making it harder to regenerate the world. Conversely, the more resonant semantic "biodiversity" of poetics can open up spaces of "cosmic poetry," potentially facilitating eco-logical futures. The ongoing regeneration of the *word* sits – or flows – in generatively metaphorical relationship with the ongoing regeneration of the *world*.

In general, the ontological scarcity of a fundamentalised Occam's razor could give way to a more fecund unity-in-diversity regarding individual, social and biospherical well-being. Late modernity could eventually give way to one of a number of eco-logical futures.

References

[1] D.F. Peat, From certainty to uncertainty: thought, theory and action in a postmodern world, Futures 39 (8) (2007) 920–929.
[2] A. Gangadean, A planetary crisis of consciousness: the end of ego-based cultures and our dimensional shift toward a sustainable global civilization, World Futures 62 (6) (2006) 441–454.
[3] S. Inayatullah, Reductionism or layered complexity? The futures of futures studies, Futures 34 (3–4) (2002) 295–302.
[4] R. Slaughter, Futures studies as a civilizational catalyst, Futures 34 (3–4) (2002) 349–363.
[5] B. Nicolescu, K.-C. Voss, Manifesto of Transdisciplinarity, State University of New York Press, Albany, NY, 2002.
[6] J.T. Klein, Prospects for transdisciplinarity, Futures 36 (4) (2004) 515–526.
[7] E.L. Boyer, Scholarship Reconsidered: Priorities of the Professoriate, Princeton University Press, Princeton, NJ, 1990.
[8] J.G. Ruggie, What makes the world hang together? Neo-utilitarianism and the social constructivist challenge, International Organization 52 (4) (1998) 855–885.
[9] D.D. Chiras, Eco-logic: teaching the biological principles of sustainability, American Biology Teacher 55 (2) (1993) 71–76.
[10] D. Robertson, A. Bundy, R. Meutzelfeldt, et al., Eco-Logic: Logic-Based Approaches to Ecological Modeling (Logic Programming), The MIT Press, Cambridge, MA, 1991.
[11] G. Hofstede, Culture's Consequences, Sage, Newbury Park, CA/London/New Delhi, 1984.
[12] S. Inayatullah, Causal Layered Analysis: poststructuralism as method, Futures 30 (8) (1998) 815–829.
[13] W.V. Eecke, Ethics in economics: from classical economics to neo-liberalism, Philosophy and Social Criticism 9 (1982) 146–167.
[14] H. Henderson, Fighting economism, Futures 28 (6–7) (1996) 580–583.
[15] P. Beyer, Religion and Globalization, Sage, London, 1994.
[16] G.S. Morson, C. Emerson, Mikhail Bakhtin: Creation of a Prosaics, Stanford University Press, Stanford, CA, 1990.
[17] F. Guattari, The Three Ecologies, Continuum, London/New York, 1989/2000.
[18] A. Naess, Ecology, Community and Lifestyle: Outline of an Ecosophy, Cambridge University Press, Cambridge, UK, 1989.
[19] J.M. Gidley, Evolving Education: A Postformal-Integral-Planetary Gaze at the Evolution of Consciousness and the Educational Imperatives, Southern Cross University, 2008.
[20] P. Arlin, Toward a metatheoretical model of cognitive development, International Journal of Aging & Human Development 7 (3) (1976) 247–253.
[21] M.L. Commons, S.N. Ross, What postformal thought is, and why it matters, World Futures 64 (5–7) (2008) 321–329.

[22] S.R. Cook-Greuter, A Detailed Description of the Development of Nine Action Logics in the Leadership Development Framework: Adapted from Ego Development Theory, 2002, www.cook-greuter.com (accessed May 29, 2007).
[23] K.F. Riegel, Dialectic operations: the final period of cognitive development, Human Development 16 (5) (1973) 346–370.
[24] J.D. Sinnott, The Development of Logic in Adulthood: Postformal Thought and its Applications, Plenum Press, New York, 1998.
[25] L.E. Villaverde, Creativity: Creativity, Art, and Aesthetics Unraveled Through Post-formalism: An Exploration of Perception, Experience, and Pedagogy, in: S. Steinberg, J.L. Kincheloe, P.H. Hinchey (Eds.), The Post-Formal Reader: Cognition and Education, Falmer Press, New York/London, 1999.
[26] J.L. Kincheloe, S.R. Steinberg, A tentative description of post-formal thinking: the critical confrontation with cognitive theory, Harvard Educational Review 63 (3) (1993) 296–320.
[27] D.T. Hansen, A poetics of teaching, Educational Theory 54 (2) (2004) 119–142.
[28] P. Abbs, Against the Flow: Education, The Arts and Postmodern Culture, RoutledgeFalmer, London/New York, 2003.
[29] J.C. Conroy, Betwixt & Between: The Liminal Imagination, Education and Democracy, Peter Lang, New York, 2004.
[30] P. Dillon, Presented at the Creativity or Conformity? Building Cultures of Creativity in Higher Education, Cardiff, 2007 (unpublished).
[31] F. Mathews, An invitation to ontopoetics: the poetic structure of being, Australian Humanities Review 43 (2007).
[32] B. Davis, Inventions of Teaching: A Genealogy, Lawrence Erlbaum Associates, Mahwah, NJ/London, 2004.
[33] D.W. Jardine, S. Friesen, P. Clifford, "Behind each jewel are three thousand sweating horses": meditations on the ontology of mathematics and mathematics education, in: D.W. Jardine, S. Frieson, P. Clifford (Eds.), Curriculum in Abundance (Studies in Curriculum Theory), Lawrence Erlbaum Associates, Mahwah, NJ, 2006.
[34] G. Bateson, Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology, Jason Aronson Inc., Northvale, NJ/London, 1987.
[35] C. Fernyhough, The dialogic mind: a dialogic approach to the higher mental functions, New Ideas in Psychology 14 (1) (1999) 47–62.
[36] M.M. Bakhtin, in: M. Holquist (Ed.), The Dialogic Imagination: Four Essays, University of Texas Press, Austin, TX, 1982.
[37] G. Malinowski, Many-valued logics, in: L. Goble (Ed.), The Blackwell Guide to Philosophical Logic, Blackwell Publishers, Malden, MA/Oxford, UK/Carlton, Vic., Australia, 2001.
[38] A. Montuori, How to make enemies and influence people: anatomy of the anti-pluralist, totalitarian mindset, Futures 37 (1) (2005) 18–21.
[39] R. Kearney, Narrative imagination: between ethics and poetics, in: R. Kearney (Ed.), The Hermeneutics of Action, Sage, London/Thousand Oaks, CA/New Delhi, 1996.
[40] M. Bunge, Social Science Under Debate, University of Toronto Press, Toronto/Buffalo, NY/London, 1998.
[41] C. Lasch, The Minimal Self, W.W. Norton & Co., New York/London, 1984.
[42] T. Gáspár, P. Gervai, L. Trautmann, The end of neoliberal history – the future of economics, Futures 35 (6) (2003) 589–608.
[43] M.B. Steger, Globalism: Market Ideology Meets Terrorism, Rowman and Littlefield, Lanham/Boulder, CO/New York/Toronto/Oxford, UK, 2005.
[44] D. Uren, The Australian, 2009, pp. 1–8.
[45] A. Smith, G. Osborne, J.B. Wight, The Wealth of Nations, Harriman House, Petersfield, UK, 1776/2007.
[46] J. Collier, T. Fuller, Corporations, ethics and global futures, Futures 37 (2–3) (2005) 111–116.
[47] J. Friedman, The Rational Choice Controversy: Economic Models of Politics Reconsidered, Yale University Press, New Haven, CT, 1996.
[48] E. Morin, Seven Complex Lessons in Education for the Future, UNESCO: Education on the Move, Paris, 2001.
[49] J. Huizinga, Homo ludens: A Study of the Play Element in Culture, Beacon Press, Boston, MA, 1971.
[50] E. Morin, Il pensiero ecologizzato, Oikos 1 (1990) 75.
[51] A. Ferrarin, Homo faber, homo sapiens, or homo politicus? Protagoras and the myth of Prometheus, The Review of Metaphysics 54 (2) (2000) 289.
[52] T. Teivainen, Enter Economism, Exit Politics: Experts, Economic Policy and the Damage to Democracy, Zed Books, London/New York, 2002.
[53] J. Niehans, A History of Economic Theory: Classic Contributions, 1720–1980, The John Hopkins University Press, Baltimore, MD, 1990.
[54] I.M.D. Little, Ethics, Economics and Politics: Principles of Public Policy, Oxford University Press, Oxford/New York, 2002.
[55] C. Sanne, Willing consumers – or locked-in? Policies for a sustainable consumption, Ecological Economics 42 (1–2) (2002) 273–287.
[56] P. Ricoeur, R.E. Kearney, The Hermeneutics of Action, Sage, London/Thousand Oaks, CA/New Delhi, 1996.
[57] M. Peters, J.D. Marshall, P. Fitzsimons, Managerialism and educational policy in a global context: foucault, neoliberalism, and the doctrine of self-management, in: N.C. Burbules, C.A. Torres (Eds.), Globalization and Education: Critical Perspectives, Routledge, New York/London, 2000.
[58] J. Kenway, J. Fahey, Imagining research otherwise, in: J. Kenway, J. Fahey (Eds.), Globalizing the Research Imagination, Routledge, London/New York, 2009.
[59] N. Power, Bachelard contra bergson: ancient atomism and the debate over continuity, Angelaki 11 (3) (2006) 117–123.
[60] R. Fuenmayor, The roots of reductionism: a counter-ontoepistemology for a systems approach, Systemic Practice and Action Research 4 (5) (1991) 391–535.
[61] E. Steinhart, Digital Metaphysics, in: T.W. Bynum, J.H. Moor (Eds.), The Digital Phoenix: How Computers are Changing Philosophy, Blackwell Publishers, Oxford, UK/Malden, MA/Carlton, Vic., Australia, 2000.
[62] V. Dusek, Philosophy of Technology: An Introduction, Blackwell Publishing, Malden, MA, 2006.
[63] A. Gare, Whitehead and Pythagoras, The Australasian Journal of Process Thought 7 (2006) 3–19.
[64] M. Heidegger, "The Question Concerning Technology" and Other Essays, Harper and Row, New York, 1977.
[65] D.R. Griffin, The Reenchantment of Science: Postmodern Proposals, State University of New York Press, Albany, NY, 1988.
[66] E. Laszlo, Science and the Reenchantment of the Cosmos: The Rise of the Integral Vision of Reality, Inner Traditions, Rochester, VT, 2006.
[67] C. Francois, Transdisciplinary unified theory, Systems Research and Behavioral Science 23 (5) (2006) 617–625.
[68] T.J. Ross, Fuzzy Logic With Engineering Applications, John Wiley and Sons Ltd., Chichester, UK, 2004.
[69] D.W. Jardine, "The fecundity of the individual case": considerations of the Pedagogic heart of interpretive work, in: D.W. Jardine, S. Friesen, P. Clifford (Eds.), Curriculum in Abundance (Studies in Curriculum Theory), Lawrence Erlbaum Associates, Mahwah, NJ, 2006.
[70] P. Abbs, A is for Aesthetic: Essays on Creative and Aesthetic Education, The Falmer Press, Lewes, UK/Philadelphia, PA, 1989.
[71] A.J.N. Judge, Metaphors as Transdisciplinary Vehicles of the Future, 1991, http://www.uia.org/uiadocs/transveh.htm (accessed November 27, 2008).
[72] G. Lakoff, M. Johnson, Metaphors We Live By, University of Chicago Press, Chicago, IL, 2003.
[73] S. Guttenplan, Objects of Metaphor, Oxford University Press, Oxford, UK, 2005.
[74] G. Lakoff, M. Johnson, Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought, Basic Books, New York, 1999.
[75] J. Heilbron, A regime of disciplines: toward a historical sociology of disciplinary knowledge, in: C. Camic, H. Joas (Eds.), The Dialogical Turn: New Roles for Sociology in the Postdisciplinary Age, Rowman & Littlefield Publishers, Inc., Lanham, Boulder, CO/New York/Toronto/Oxford, UK, 2003.
[76] A.K. Giri, The calling of a creative transdisciplinarity, Futures: The Journal of Policy, Planning and Futures Studies 34 (1) (2002) 103.
[77] N.J. Smelser, Interdisciplinarity in theory and practice, in: C. Camic, H. Joas (Eds.), The Dialogical Turn: New Roles for Sociology in the Postdisciplinary Age, Rowman & Littlefield Publishers, Inc., Lanham, Boulder, CO/New York/Toronto/Oxford, UK, 2004.
[78] R. Adler, J.C. Ewing, et al., Citations Statistics: A Report, Joint IMU/ICIAM/IMS-Committee on Quantitative Assessment of Research, 2008, http://www.mathunion.org/fileadmin/IMU/Report/CitationStatistics.pdf (accessed July 5, 2009).
[79] M. Finkenthal, Interdisciplinarity: Toward the Definition of a Metadiscipline? Peter Lang, New York, NY, 2001.
[80] M. Bischof, Verdansky's Noosphere and Slavophile Sobornost, in: L.V. Beloussov, V.L. Voeikov, V.S. Martynyuk (Eds.), Biophotonics and Coherent Systems in Biology, Springer, New York, 2005.
[81] A. Naess, H.e. Glasser, A.e. Drengson, et al., The Selected Works of Arne Naess. Deep Ecology of Wisdom: Explorations in Unities of Nature and Cultures, Selected Papers, Springer, Dordrecht, Netherlands, 2005.
[82] G.P. Hampson, Integral re-views postmodernism: the way out is through, Integral Review 4 (2007) 108–173.
[83] B.E. Tonn, Futures sustainability, Futures 39 (9) (2007) 1097–1116.
[84] P. Mulvihill, R., M. Milan, J., Subtle world: beyond sustainability, beyond information, Futures 39 (6) (2007) 657–668.
[85] A. Jamison, The making of green knowledge: the contribution from activism, Futures 35 (7) (2003) 703–716.

[86] A. Fricker, The ethics of enough, Futures 34 (5) (2002) 365–477.
[87] A. Escobar, Construction nature: elements for a post-structuralist political ecology, Futures 28 (4) (1996) 325–343.
[88] T. Stevenson, Time for social technologies? Futures 36 (1) (2004) 109–113.
[89] K. Wilber, Integral Psychology: Consciousness, Spirit, Psychology, Therapy, Shambhala, Boston, MA/London, 2000.
[90] M.L. Commons, E.J. Trudeau, S.A. Stein, et al., Hierarchical complexity of tasks shows the existence of developmental stages, Developmental Review 18 (3) (1998) 237–278.
[91] J. Piaget, Psychology of Intelligence, Routledge, London/New York, 1947/2001.
[92] G.J. Klir, B. Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, Prentice Hall, Upper Saddle River, NJ, 1995.
[93] L.A. Zadeh, G.J. Klir, B. Yuan, Fuzzy Sets, Fuzzy Logic, and Fuzzy Systems: Selected Papers by L.A. Zadeh, World Scientific, Singapore/Hackensack, NJ/London/Delhi/Shanghai/Beijing/Hong Kong, 1996.
[94] A. Hájek, Probability, logic, and probability logic, in: L. Goble (Ed.), The Blackwell Guide to Philosophical Logic, Blackwell Publishers, Malden, MA/Oxford, UK, 2001.
[95] M. Aaltonen, The return to multi-causality, Journal of Future Studies 12 (1) (2007) 81–86.
[96] R. Goldstein, Incompleteness:, The Proof and Paradox of Kurt Godel, W.W. Norton & Company, New York, 2005.
[97] H. Wang, A Logical Journey: From Godel to Philosophy, Massachusetts Institute of Technology Press, Cambridge, MA, 1996.
[98] E.D. Mares, R.K. Meyer, Relevant logic, in: L. Goble (Ed.), The Blackwell Guide to Philosophical Logic, Blackwell Publishers, Malden, MA/Oxford, UK, 2001.
[99] R. Smullyan, Gödel's incompleteness theorems, in: L. Goble (Ed.), The Blackwell Guide to Philosophical Logic, Blackwell Publishers, Malden, MA/Oxford, UK, 2001.
[100] R. Jakobson, Selected Writings: Poetry of Grammar and Grammer of Poetry, Mouton De Gruyter, The Hague, The Netherlands, 1982.
[101] M. Herzfeld, Cultural Intimacy: Social Poetics in the Nation-State, Routledge, Abingdon, UK, 2005.
[102] L. Montrose, Professing the renaissance: the poetics and politics of culture, in: J. Rivkin, M. Ryan (Eds.), Literary Theory, Blackwell, Malden, MA/Oxford, UK/Carlton, Vic., Australia, 2004, pp. 584–591.
[103] B. Harshav, Poetics plus, poetics today 1. Special issue: literature, interpretation, Communication 1–2 (1979) 5–6.
[104] E.R. Wolfson, Langauge, Eros, Being: Kabbalistic Hermeneutics and Poetic Imagination, Fordham University Press, Bronx, NY, 2005.
[105] B. Eichenbaum, The formal method, in: J. Rivkin, M. Ryan (Eds.), Literary Theory, Blackwell, Malden, MA, US/Oxford, UK/Carlton, Vic., Australia, 2004 pp. 584–591.
[106] Sklovskij, Potebnja, Poetika: Sborniki po teorii poeticeskogo jazyka, Petrograd, 1919.
[107] L. Hutcheon, A Poetics of Postmodernism: History, Theory, Fiction, Routledge, London/New York, 1998.
[108] J. Steyn, Art: futures of the past, Futures 39 (10) (2007) 1168–1177.
[109] R.H. Brown, A Poetic for Sociology: Toward a Logic of Discovery for the Human Sciences, University of Chicago Press, Chicago, IL, 1989.
[110] P. Stockwell, Cognitive Poetics: An Introduction, Routledge, London/New York, 2002.
[111] D.W. Gilcrest, Greening the Lyre: Environmental Poetics and Ethics, University of Nevada Press, Reno, Nevada, US, 2002.
[112] M. Roth, The Poetics of Resistance: Heidegger's Line, Northwestern University Press, 1996.
[113] M.A. Peters, T. Besley, Presented at the Toward a New Critical Language in Education, Oxford University, 2006 (unpublished).
[114] P. Stallybrass, A. White, The politics and poetics of transgression, in: M. Lambek (Ed.), A Reader in the Anthropology of Religion, Blackwell Publishing, Malden, MA/Oxford, UK/Carlton, Vic., Australia, 2002.
[115] E. Morin, Restricted complexity, general complexity, in: C. Gershenson, D. Aerts, B. Edmonds (Eds.), Worldviews, Science and Us: Philosophy and Complexity, World Scientific Publishing Co., Singapore, 2007.
[116] A. Koestler, The Ghost in the Machine, Hutchinson and Co., London/Melbourne/Sydney/Auckland/Bombay/Toronto/Johannesberg/New York, 1967.