

# Chapter 8

If metaphysics be turned out of the door, it will come in at the window.

J.E.Mercer, *The Problem of Creation*

## Conclusions

### 8.1 Overview

The aim of this study was to establish the thesis that computationalism is insufficient as a metaphysical basis for a unifying framework of "strong" emergent artificiality. The method adopted (chapter 1) involved the following: (1) Detailed examination of the concepts of computationalism (chapter 2), emergence (chapter 3) and artificiality (chapter 4) with a view to establishing a philosophical basis for their unification; (2) development of a unified framework of computationally emergent artificiality or CEA realized in a cellular automaton substrate based on a computational interpretation of Alexanderian metaphysics (chapter 5); (3) investigation of the distinction between ontical (causal, productive) and ontological (existential, incipient) concepts of *poiēsis* (becoming, coming-forth, bringing-forth) with a view to defining a *poiētic difference* between naturals and artificials grounded in Heidegger's ontological difference between beings and Being *as such* (chapter 6); (4) explication of the *poiētic difference* via a phenomenological framework for evaluating designed and emergent artificiality based on ontic (productive, organizational) and epistemic (interpretative, observational) relations between phenomena (naturals and artificials) and the anthropic component (human artificer-interpreter). Application of this framework in differentiating "hard" (or

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pure) from "soft" (or impure) artificiality (as artifactuality) and classification of computationalism as an instance of the former. Confirmation of the thesis via demonstration of the failure of computationalism to solve the category problem, viz. the problem of explaining how ontological subjectivity can emerge from an ontologically-objective substrate (chapter 7).

In this chapter, it is shown that the thesis objective has been achieved: First, the Heideggerian *poiētic* critique of computationally emergent artificiality presented in this dissertation is summarized. Second, the main contributions of this study are briefly outlined. Third, a number of shortcomings associated with the presentation are identified. Finally, the principal conclusions to be drawn from this investigation and some recommendations for future work are briefly described.

## 8.2. Summary

The aim of this study was to establish the thesis that computationalism is insufficient as a metaphysical basis for a unifying framework of "strong" emergent artificiality.

Computationalism (chapter 2) is the metaphysical view that phenomena such as matter, life and mind are computationally-grounded, that is, computational in essence (being, ontology). Computation is an abstract process which is formalistic (externalistic, ontologically-objective) and mechanistic (deterministic, operationally-necessary) and can be formally defined in terms of the syntactic symbol-processing associated with Turing machines realized in cellular automata (CAs).

Emergence (chapter 3) refers to the appearance of new properties in a systemic complex that were not present in any of its components considered in isolation or in other complexes. The concept of emergence can be interpreted epistemologically (non-predictability of system properties from component properties) and ontologically (non-generability of system properties from component properties).

Artificiality (chapter 4) denotes the class of artifactual (man-made, synthetic) analogues of natural phenomena. "Strong" computationally emergent artificiality (CEA) denotes that sub-class of artificiality which is emergent, isomorphic (functionally, behaviourally, structurally) with naturality (nature), and grounded in a computational substrate. A CA-computationalist interpretation of Alexander's Space-Time event ontology can be shown to provide a suitable emergentist framework within which to unify CEA: CA implementations of artificialities (such as AI, A-Life and A-Physics) can be unified because non-reversible computation universal CAs (NRUCAs) support the self-organizing construction of embedded virtual machine hierarchies (chapter 5). This is significant since to the extent that Alexanderian emergentism is successful in unifying naturality, it follows that CA-computationalism must be capable of supporting "strong" artificiality.

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Two interpretations of artificiality can be distinguished: (1) artificiality as appearance (contrasted with reality), and (2) artificiality as artifactuality (contrasted with naturality). The former (Kantian) distinction is epistemological and can be shown to support the possibility of "strong" CEA: The postulated discrete decoupling of appearance (existence) from reality (essence) allows for multiple-instantiation of the latter and a shift in focus from the relation between appearance and reality to the relations (correspondences, isomorphisms) between natural and artificial phenomena (existents) as instantiations of some underlying abstract noumenal (essential) form. The latter (Heideggerian) distinction, by contrast, is ontological and grounded in a postulated continuous coupling (or unitary relatedness) of appearance and appearing which denote the 'static' (or stable) and 'dynamic' (or unstable) aspects of Being respectively (chapter 1). Given this unitary coupling relation (of Being and becoming) and the discrete (that is, pluralistic) structure of Being, naturals can be distinguished from artificials (as artifactuals) on the basis of a difference in their respective modes of *poiēsis* (becoming): In short, a *poiētic difference* entails an *ontical difference*, that is, a difference in the Being of beings (chapter 6).

*Poiēsis* (becoming, coming-forth, bringing-forth) can be identified as the unitary ontological concept underlying the unified framework of CEA: Computationalism is isomorphic with universal mechanistic (externalistic, deterministic) causation and to the extent that the latter is a genetic relation and hence, a relation of becoming, it follows that computationalism is *poiētic*; emergence implies some form of coming-forth and hence, *poiēsis*; finally, artificiality as artifactuality implies making which is a kind of *poiēsis*.

Two concepts of *poiēsis* (chapter 6) can be distinguished using Heideggerian phenomenology: (1) ontical (causal, productive) and (2) ontological (existential, incipient). Ontical *poiēsis* can be differentiated into four kinds: (i) evolution, (ii) self-organization, (iii) creation and (iv) making. Artificing (or making) can be interpreted in terms of a triadic relation between three components: productant (artificer), substratum (material) and product (artifact). This relation can be analysed in terms of Aristotelian (material, formal, final, efficient) causality. To the extent that ontical *poiēsis* can be characterized in terms of externality (ontological-objectivity) and determinism (operational-necessity), CA-computationalism (chapter 5) can be shown to support ontical *poiēsis*.

Ontical *poiēsis* is problematic for (at least) three reasons: (1) It is tacitly grounded in an absolutist interpretation of the maxim *ex nihilo nihil fit* (from nothing comes nothing) and thereby incapable of supporting ontological (category) emergence: This follows from the fact that the latter involves absolute *creatio ex nihilo* (creation from nothing) which is ontically-incommensurable with *ex nihilo nihil fit*. However, it is important to appreciate that absolute *creatio ex nihilo* cannot be ontical since on this view, nothing is static (void) and hence, non-generative. Given that ontical *poiēsis* is externalistic

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(ontologically-objective) and incapable of ontological emergence, it follows that it cannot solve the category problem (chapter 7), that is, the problem of explaining how ontological-subjectivity can emerge from an ontologically-objective substrate; (2) ontical *poiēsis* (which is a relation between beings) implies either (i) a finite chain of causation and the postulation of a First (or Necessary) cause which undermines the transitivity of the causal principle, (ii) an infinite chain of causation which Aristotle has shown to be impossible as an actuality (existent), or (iii) a circular chain of causation which engenders paradox; (3) ontical *poiēsis*, as a genetically-causal relation between beings, fails to address why there is causation (rather than nothing): To the extent that the causal relation is a relation, it partakes of Being and hence, cannot be ontologically primitive.

Meditation on the question concerning Being can inform on the question concerning the possibility of "strong" CEA by laying a foundation for clarifying the distinction between ontical (causal) and ontological (incipient) *poiēsis*. Heideggerian phenomenology (that is, post-metaphysical ontology) can be used to clarify the meaning (structural-intelligibility) and truth (unconcealing-incipience) of Being: According to Heidegger, Being is neither a being nor an abstraction from beings nor the cause of beings; rather, it is the necessary existential condition for there being beings rather than nothing (void). Being is that which enables beings to be and be appreciated as beings; hence, a distinction can be made between beings (*Seiendes*), the Being (*Sein*) of beings, and Being *as such* (*Seyn*). Heidegger refers to the distinction between beings and Being as the *ontological difference*.

To the extent that Being is not a being, it follows that it must, in some sense, be the 'same' as nothing. Heidegger follows the Greeks in understanding Being as *aletheia-physis*, that is, the self-emerging power of unconcealment. Primary truth as unconcealment (*poiēsis*) can be shown to be grounding relative to secondary truth as correspondence (*noesis*); hence, the *poiētic* artifactual-natural distinction is grounding relative to the Kantian *noetic* appearance-reality distinction. On Heidegger's view, Being means presencing which has two aspects: 'static' (stable appearance) and 'dynamic' (unstable appearing); hence, the unitary relatedness of Being and becoming. Given the dynamic aspect of Being and its 'sameness' with nothing (as groundless ground or abyss), it follows that nothing must also have a dynamic aspect. This allows for an ontological interpretation of absolute *creatio ex nihilo*, which can be rendered commensurable with *ex nihilo nihil fit* in the maxim *ex nihilo omne ens qua ens fit* (from nothing every thing as thing comes to be), and renders ontological emergence possible.

The structure of Being (*Sein*) can be shown to be discrete (discontinuous, pluralistic): Interpreting Being universally as existence (brute facticity, actuality, extantness) fails to characterize the Being of (i) imaginaries (such as centaurs), (ii) impossibles (such as square circles), thereby indicating the inadequacy of modal logic, (iii) abstracts (such as numbers), and (iv) persons (*Daseins* or beings-in-the-world which are characterized by who-ness rather than what-ness). *Dasein* is that 'site' (or 'clearing') within Being *as such*

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(*Seyn*) at which the Being (*Sein*) of beings unconceals and is thereby a necessary condition for meaning (intelligibility). *Dasein* is ontically-ontological in that it transcends from beings to Being *as such*. To the extent that the latter can be characterized as the *apeiron* or in-finite repelling of limits (since finitude or limitation is characteristic of beings), it can be shown that Being *as such* is openness and hence, *Dasein* as transcendence to Being is ontologically-open.

Using Heideggerian phenomenology (ontology), the four kinds of ontical *poiēsis* can be ontologically classified into two types, both of which are defined in terms of movements between beings: (1) derivative *physis* (finite self-becoming, *autopoiēsis*) and (2) *technē* (finite other-becoming, *allopoiēsis*). The concept of autopoiesis as proposed by Maturana and Varela is not the same as derivative *physis* (*autopoiēsis*): The former is ontical (causal) and superveniently-grounded in mechanism thereby allowing for multiple-instantiation of the autopoietic organization; the latter, by contrast, is ontological (existential) and stands in essential, unitary relation to originary *physis* which, as Being, is the groundless ground (or abyss). Given the ontological difference, the two ontological types of ontical *poiēsis* must be grounded in ontological *poiēsis* as originary in-finite *physis*, an incipient (creative) movement between Being and beings. Derivative *physis* stands in continuous (unmediated) *poiētic* relation to originary *physis* whereas *technē* stands in discontinuous (mediated) *poiētic* relation to originary *physis*: For this reason, derivative *physis* (naturalness) is capable of ontological emergence and characterized by categorial-openness whereas *technē* (artificiality as artifactuality) is categorially-closed (circumscribed). Naturals and artificials are ontically distinct because a *poiētic* isomorphism cannot be established between them: In short, the *ontological difference* (between beings and Being) grounds a *poiētic difference* (between naturals and artificials) which entails an *ontical difference* (in the respective Being of naturals and artificials).

Three types of emergentism can be distinguished: structuralist, physicalist and pragmatist. Each can be shown to be incapable of supporting ontological emergence for two reasons: (1) ontological-objectivity of conception and tacit commitment to ontical *ex nihilo nihil fit* entailing categorial closure and hence, inability to resolve the category problem (chapter 7); (2) failure to appreciate the ontological difference and the necessity of grounding causal beings in incipient Being. The category problem can be solved on a pluralistic emergentism grounded in Heideggerian phenomenology: The ontological priority of ontological objectivity over ontological subjectivity is rejected and both are held to be simultaneously emergent from primordial being-in-the-world. This type of ontological emergence is of the same order as the ontological emergence of beings from nothing (Being). Three types of emergence can be distinguished on Heideggerian pluralistic emergentism: Causal (ontical-ontological), hermeneutic (ontological-ontical) and incipient (grounding-ontical, grounding-ontological).

The *poiētic difference* can be explicated via a phenomenological framework (chapter 7)

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for comparing designed and emergent artificiality based on historical (*a priori* and *a posteriori*) ontic (productive, organizational) and epistemic (interpretative, observational) relations between phenomena (naturals and artificials) and the historically-thematic anthropic component (human artificer-interpreter).

"Hard" (or pure) and "soft" (or impure) naturals and artificials can be differentiated on the basis of distinctions in the *poiētic* phenomenology of matter and form in such phenomena. Computation is identified as the defining exemplar of "hard" artificiality. Given this fact, computationalism can be shown to be an abstract or idealist metaphysics.

There is no distinction between designed and emergent "hard" artifacts with respect to their *poiētic* and hence, ontical difference from naturals: This follows from the fact that the *poiētic* phenomenology of form can be shown to follow that of matter with respect to ontical relationality in "hard" artifacts because the latter are ontologically-objective (externalistic) and operationally-necessary (deterministic). Teleology cannot be eliminated from the concept of artificiality because the epistemic *a priori* (design, specification) of the matter in "hard" artifacts entails determinism: In short, in "hard" artifacts epistemology defines teleology and epistemic circumscription entails closure to ontological (category) emergence.

Computationalism, being an instance of "hard" artificiality is incapable of ontological emergence (since categorially-closed) and hence, cannot solve the category problem, that is, the problem of explaining how ontological subjectivity can emerge from an ontologically-objective substrate.

### 8.3. Contributions

The main contributions of this study are as follows:

1. The concept of the *poiētic difference* (chapter 6), that is, the distinction in becoming (coming-forth, bringing-forth) between naturals and artificials (as artifactuals). Although precedents certainly exist for such a difference in the phenomenological ontology of Heidegger and the theoretical cybernetics of Maturana and Varela, until now the *poiētic difference* has not been explicitly formulated as a difference. Furthermore, such precedents have (1) either failed to address (Maturana) or only implied (Heidegger) the grounding of this difference in the *ontological difference* (between beings and Being). This fact is of critical significance in the context of the debate over the possibility of "strong" CEA since the grounding of the *poiētic* difference in the ontological difference has *ontical* implications, that is, implications for the Being of natural and artificial (as artifactual) beings.
  2. Phenomenological demonstration of the grounding of the Kantian appearance-reality distinction in the *poiētic* artifactuality-naturality distinction effecting a
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recontextualization of the problem of "strong" artificiality (chapter 6).

3. The concept of pluralistic emergentism as grounded in Heideggerian phenomenology. The relation between ontical (causal) and ontological (hermeneutic) emergence and their grounding in incipient (originary) emergence (chapter 6).

4. A phenomenological framework for explicating the *poiētic difference* in terms of historical (*a priori* and *a posteriori*) ontic (productive, organizational) and epistemic (interpretative, observational) relations between phenomena (naturals and artificials) and the anthropic component (human artificer-interpreter) (chapter 7).

5. The distinction between "soft" (or impure) and "hard" (or pure) artifacts and the identification of computation as the defining exemplar of the latter (chapter 7).

6. The unification of artificialities (that is, artifactual analogues of natural phenomena) under a CA-computationalist interpretation of the emergentist Space-Time event ontology of Alexander (chapter 5).

7. The identification of computationalism as an eclectic (synthetic, postulational) metaphysics using Pepper's root metaphor method (chapter 2).

## 8.4. Shortcomings

Potential shortcomings associated with this study include the following:

1. The interpretation of "soft" (or impure) naturalness as materially-made (ontically *a posteriori*, epistemically *a priori*) and formally-given (ontically *a priori*, epistemically *a posteriori*) is problematic since it appears to collapse onto "hard" (or pure) artifactuality. This follows from the fact that ontological circumscription (bounding, closure) of the substratum (matter) in artificing (at least partially) determines the ontology of the product (form). In the limit when the substratum (object) is completely circumscribed by the productant (subject), matter itself becomes artifactually-formal (ideal) and the relation between substratum (matter) and product (form) becomes operationally-necessary and ontologically-objective, that is, computational.

2. Although it is explicitly maintained that the anthropic component is emergent from *Dasein* and the latter has being-with (other *Daseins*) as a fundamental existential structure, the social ontology of the anthropic component (human artificer-interpreter) *as such* has not been addressed in this study.

3. The epistemic relationality between the anthropic component (artificer-interpreter) and phenomena (naturals and artificials) has been defined in terms of the binary opposition between specification (epistemically *a priori*) and interpretation

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(epistemically *a posteriori*). While the former has been examined in some detail in connection with phenomenological analysis of the link between *technē* (artificing), *archē* (incipience, origination), *telos* (end) and *epistemē* (knowing), the latter has been treated superficially. In defending this position appeal is made to the fact that this study is concerned with establishing the impossibility of "strong" CEA on the basis of the *poiētic* difference between naturals and artificials (as artifactuals); in short, the focus of concern is anthropic *production* and not *use*<sup>1</sup>.

4. The concept of pluralistic-emergentism as grounded in Heideggerian phenomenology remains somewhat speculative and imprecisely-formulated.

It might be argued that the validity of the entire critique rests on the *metaphysical assumption* of the reality and primordially of the concept of Being. However, this position is problematic for the following reasons: (1) The existence of ontologically-irreducible phenomena such as matter, life and mind which cannot be explained on conventional (metaphysical) emergentist schemes; (2) the existential fact that there is something rather than nothing indicating thereby an underlying *givenness*; (3) the metaphysical problems associated with finite, infinite and circular causation and the need to ground the causal relation in that which transcends causation; (4) most importantly, the fact that *all* concepts *necessarily* partake of Being and yet the latter is not a mere fundamental concept but rather the existential condition for conceptualization *as such*. On this basis, it is maintained - following Heidegger - that Being is neither an assumption nor a proviso: It is simply the groundless ground. As Heidegger states "It is It Itself."

## 8.5. Conclusions and Recommendations

The principal conclusions to be drawn from this study are as follows:

1. Computationalism is insufficient as a metaphysical basis for a unified framework of "strong" emergent artificiality. This follows from the fact that computationalism is an ontologically-objective, deterministic and categorially-closed metaphysics and hence, is incapable of solving the category problem, that is, the problem of explaining how ontological-subjectivity can emerge from an ontologically-objective substrate. "Strong" CEA is impossible because the latter is a *unified* concept and *partial* ontological-incompleteness, that is, failure to realize an artifactual analogue of a natural phenomenon (in this case ontological subjectivity), entails *totalistic* ontological-incompleteness.

2. Computationalism is categorially-closed because it is the defining exemplar of "hard" (or pure) artificiality which is grounded in the categorially-closed *poiētic* modality

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<sup>1</sup> On Heideggerian phenomenology, interpretation (hermeneutics) is a mode of Being (intelligibility) characterized by *praxical* coping in-the-world (chapter 1).

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of *technē* (that is, artificing). For this reason, computational-naturalism or computationally emergent naturalness (CEN) is ontologically incoherent.

3. Given that naturalness (that is, nature) *has*, apparently, 'solved' the category problem and given the ontological incoherence of computational-naturalism on *poiētic* grounds, it follows that naturalness cannot be ontologically-computational. This fact motivates consideration of (i) post-computationalist metaphysical systems and (ii) post-*metaphysical* ontologies as means by which to understand naturalness.

4. Designed and emergent computational artifacts can be shown to be ontologically equivalent because of the categorial closure to ontological emergence and operational necessity (determinism) of "hard" (or pure) artifacts.

5. The Being of objects is ontologically-objective, that is, externalistic and externally-related. However, given the existence of experiential entities (humans and possibly other higher-order entities), it follows that there are (at least some) beings whose Being is (at least partially) ontologically-subjective, that is, internalistic and internally-related. Since objects cannot give rise to subjects, any mode of *poiēsis* involving purely objective (external) relations between beings and an artificing subject can only lead to the production of objects. Modern *technē*-Enframing (*Gestellen*) is a mode of *poiēsis* which *takes* beings as objective, that is, encounters them as externalistic vacuous actualities<sup>2</sup>, and *orders* them by placing them into external relations with each other according to some plan (top-down or bottom-up). The implication is that *technē* (artificing), a triadic causal relation between a productant (subjective artificer), substratum (objective material) and product (objective artifact), is a categorially-closed mode of *poiēsis*. On this basis, it can be concluded that to the extent that an artifact is artifactual, that is, circumscribed in its Being by an artificing 'other', it cannot be experiential: "Hard" (or pure) artifacts define the standard of artifactuality *as* artifactuality and, as has been shown, are non-experiential. To the extent that "soft" (or impure) artifacts *are* capable of experience, it follows that this must be on account of their substrata being *natural*, thereby allowing for the possibility of 'break out' from the externally-imposed form (structure) defining their *artifactuality*.

Recommendations for future work include the following:

1. Given (i) the existential facticity of the "hard" problem of consciousness (ontological-subjectivity, first-personhood, experiential-awareness), (ii) the failure of structuralist, physicalist, and pragmatist emergentisms to solve this problem, and (iii) the assumption that an emergentist solution to this problem remains possible, it is maintained that Heideggerian pluralistic emergentism constitutes an appropriate ontological

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<sup>2</sup> Whitehead (1933) defines vacuous actualities as beings "'devoid of any individual enjoyment arising from the mere fact of realization in that context'." (p.212)

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framework within which to address this problem. In order to clarify the nature of this scheme, it is necessary to phenomenologically investigate (i) the concept of nothing, (ii) the ontology of incipience (that is, the movement between Being and beings) and (iii) the relation between incipience and other kinds of emergence in greater detail.

2. Given (i) the existential facticity of the "hard" problem of consciousness (ontological-subjectivity, first-personhood, experiential-awareness) and (ii) the assumption that an emergentist solution to this problem is impossible, it appears that some variant of Whiteheadian panexperientialism (chapter 1) offers the most promising alternative to computationalism as a metaphysics for naturality. However, given that panexperientialism *as* a metaphysics fails to address the ontological difference (between beings and Being), it is maintained that the former must incorporate certain elements from Heideggerian phenomenology, specifically, the concept of Being *as such* and the notion of incipient (or originary) emergence.

3. The adoption of some variant of Whiteheadian panexperientialism has implications both for the philosophy of technology and for post-computationalist technology itself. It is maintained that cellular automata - which are "hard" (or pure) artifacts - should be replaced by *hybrid* multi-agent systems with natural substrates<sup>3</sup> - which are "soft" (or impure) artifacts - as the standard approach for investigating complex systems. As Gould (1986) states,

we must allow our thinking to move out of the deterministic-probabilistic dichotomy towards structures that allow, forbid, but do not require. This, it seems to me, allows the most fundamental aspect of being human, namely an acknowledgement of consciousness itself, and its self-reflective capacity, to enter our structural descriptions. (p.10)

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In this connection, Cariani's (1989, 1991) evolutionary robotic devices (adaptive syntax and semantics) constitute a suitable primitive for an agent. However, *hybrid* multi-agent systems can incorporate other agentive kinds such as human artificer-interpreters.

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