Chapter 7

It was when intelligence and knowledge appeared
That the Great Artifice began.

Lao Tzu, The *Tao Te Ching*

Critique

7.1 Overview

In this chapter the folk-psychological view that artifacts are *made* whereas naturals are *given*[1] (or *found*) and that therein lies their essential difference is defended as a basis upon which to mount a phenomenological critique of computationally emergent artificiality or CEA (chapter 5). In the previous chapter, it was shown, following Heidegger, that historicity (which includes both origin and unfolding) is constitutive of the Being of a being: Given the essential, unitary relatedness of Being and becoming, it is impossible to separate *what-ness* (essence) from *that-ness* (existence) (which, in fact, means *how-ness*), thereby undermining the possibility of multiple-realizability, functionalism and hence, "strong" CEA. On this basis, a *poiētic difference* was established between *physis* (naturality) and *technē* (artificiality). The aims of this chapter are threefold: First, clarify the nature (Being) of this difference via a phenomenological framework of ontic (productive, organizational) and epistemic (interpretative, observational) relations between phenomena (naturals and artificials) and what is referred to as the anthropic component, that is, the human artificer-interpreter; second, use this framework (i) to distinguish between "hard" (or pure) and "soft" (or impure) artifactual

[1] According to Macquarrie (1973), "to say that anything `exists' is simply to point to the fact `that it is'. Existence is characterized by concreteness and particularity and also by *a sheer givenness* [emphasis added]." (p.61)

types, identifying computationalism as the defining exemplar of the former, and (ii) to establish the fact that, *ontologically-speaking*, there is no difference between designed and emergent "hard" artifacts with respect to their distinction from naturals[2]; third, undermine the possibility of "strong" CEA by showing how (1) the ontological objectivity (externality, third-personhood) and (2) categorial-closure of "hard" artifacts prevents ontological emergence, thereby rendering CEA incapable of solving the category problem[3]. Since CEA is a *unified* framework (chapter 5), a single case where it fails to realize (that is, instantiate) a natural phenomenon suffices to undermine the validity of computationalism. Clearly, this fact has implications that transcend the immediate debate over the possibility of "strong" AI or "strong" consciousness: For example, if pluralistic emergentism of the radical Heideggerian type described in chapter 6 is rejected - and such a rejection is *necessary* given that computationalism is a metaphysics[4] - some form of dual-aspect metaphysics such as panexperientialism (chapter 1) appears to become ontologically necessary. To the extent that computational A-Life (chapter 4) defines life in ontologically-objective (or externalistic) terms, it follows that computational A-Lifeforms are incapable of giving rise to consciousness. Yet on panexperientialism, consciousness (mind) is held to arise from the brain (life) which is, itself, an experiential phenomenon of lower order[5]. In short, computationalism cannot instantiate panexperientialism since it is ontologically encompassed by the latter; categorially-closed externalistic (that is, ontologically-objective) accounts of biology and physics must, therefore, be incomplete. Of course, this does not entail holding that phenomenal life and matter are incomplete since life (phenomenon) is not biology (description) and matter (phenomenon) is not physics (description). This follows from the fact that matter and life, as naturals, are *givens* and hence, epistemology (description) and ontology (phenomenon) are only *contingently* (or *a posteriori*) related from the perspective of the anthropic component (human artificier-interpreter). In A-Physics and A-Life, by contrast, epistemology (description) and ontology (phenomenon) are *necessarily* (or *a priori*) related; as will be seen in what follows, artifacts manifest embedded intentionality which is *expressed* in ontologically-objective form in the artificing movement from possibility (in the artificer) to actuality-potentiality (in the artifact).

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2 In short, the *poiētic difference* applies to both designed (or top-down) and emergent (or bottom-up) artificiality.

3 That is, the problem of explaining how ontological-subjectivity can arise from an ontologically-objective substrate.

4 On computationalism or `digital metaphysics' (Steinhart,98) - which is a monism - Being *is* computation. On Heidegger's pluralistic view, by contrast, computation is a mode of Being and hence, grounded in the latter.

5 Order here implies difference of *degree* and not of *kind* and follows from the panexperientialist commitment to the ontological continuity of phenomena (chapter 6).

7.2. Phenomenological Framework

In this section, the ontology of the anthropic component and its ontic (productive, organizational) and epistemic (interpretative, observational) relations to phenomena (natural and artificial) are described.

7.2.1. The Anthropic Component

In this section, the ontology of the anthropic component, that is, the human being in its capacity as artificer (or organizer) and interpreter (or observer) is briefly described. It is crucial to appreciate at the outset that the presentation is concerned *only* with explicating the Being of the human artificer-interpreter from a *poiētic* perspective, that is, from the perspective of its *historical* relation to the becoming of natural and artificial (as artifactual) phenomena; hence, issues relating to functionality, *praxis* (or use) and interpretation (semantics, meaning) are not considered in this study[6]. Although the Being of the anthropic component *as* anthropic component cannot be defined independently of its relation to such phenomena (section 7.2.2), the question concerning the Being of the relation - which is a *distinction* - between the anthropic component and its primordial ontological ground, viz. *Dasein* (chapter 6), must be addressed and it is this relation (distinction) which is examined in what follows.

Margolis (1989) presents an interpretation of *Dasein* grounded in the following assumptions which he takes to be doctrines upon which philosophy is converging, viz. "(a) the rejection of all forms of cognitive transparency and privilege; (b) the indissoluble unity of realist and idealist elements in any plausible theory of the sciences; (c) the conceptual symbiosis of cognizing self and cognized world; (d) the matched historicity of self, science, and world." (p.1) On this basis, he is led to conclude that "*the human self is itself technologically and praxically constituted*" (p.4) and that "the theory of the technologized self is, primarily, a theory of the contingently constituted, societally formed, historicized, diachronically alterable practices of actual human communities." (p.5) Crucially, he maintains that

> it follows instantly from the theory of the praxical or technical constitution of the self that *all* would-be findings of invariances, natural necessities, nomic universals, essences, closed systems, indubitability, self-evidence and the like *must be no more than idealized posits made within the indefinable limits of the competence and horizon of contingently formed and focused selves*. (pp.4-5)

There are (at least) two points to note in connection with the above statement: First, *epistemological* relativism (that is, historical-situatedness and finitude of the cognizing

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6 Searle (1992, 1995) presents an extended realist analysis of the distinction in *functional* Being between artifacts - or `institutional facts' - and naturals grounded in the *as*-structure (chapter 6), viz. *X* counts as *Y* in context *C*, from the perspective of the human subject as a conscious, thematic intentional agent. Heidegger (1995), by contrast, presents an interpretation of this structure in non-thematic terms.

self) does not entail *ontological* (or metaphysical) relativism (or constructivism); and second, metaphysical relativism is ultimately self-defeating since as Nagel (1997) states,

> the claim `Everything is subjective [or relative]' must be nonsense, for it would itself have to be either subjective or objective [that is, absolute]. But it can't be objective, since in that case it would be false if true. And it can't be subjective, because then it would not rule out any objective claim, including the claim that it is objectively false. (p.15)

For this reason, Mingers (1995), while endorsing the epistemological insights of constructivists such as Maturana - which are broadly consistent with those of Margolis - is led to adopt a *critical realist*[7] position with respect to ontology (chapter 6). It is important to appreciate that Margolis' *constructivist* interpretation of self and other (world) is grounded in his insistence that essentialism is false and that "the world is a flux, reconstituted again and again through powers internal to its own contingent order, centred in local interventions at particular cognizing nodes." (p.6) However, according to Heidegger (chapter 6), it is possible - and, on Rescher's (1996) view, necessary - to reconcile the contingency of existence with the universality of essence: If the world *is* (a) flux then flux *is* its essence; in short, *the Being (Sein) of the world is to-be-changing and this is fundamental (essential)*[8]. Furthermore, Margolis' *technologically-deterministic* interpretation of *Dasein* is `overcome' (or transcended) in the thought of the post-*Kehre* Heidegger which recontextualizes the pre-*Kehre* praxical interpretation of *Dasein* relative to the question concerning Being *as such* (*Seyn*): For Heidegger, *technē* is a mode (or way) of unconcealing Being[9]; hence, the technological or praxical interpretation of *Dasein*, is an existent*iell* - and not an existent*ial* - structure[10]. While some technologically-minded interpreters have, somewhat polemically and for rhetorical purposes, regarded Heidegger's later thinking as `nostalgic' and `romantic' (chapter 6), it is consistent with both the pre- and post-*Kehre* projects to interpret *Dasein* as *transcendence simpliciter*, that is, projective self-interpretation, and reject the technologically-deterministic interpretation of human being: This follows from the fact that what man transcends are not epochs (interpretations) of technology but epochs of

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7 Critical realism is consistent with Heideggerian pluralistic-realism (chapter 6).

8 To paraphrase Rescher, that which is fixed (essential, unchanging) is change itself.

9 It is crucial to appreciate that Heidegger is an ontologist, not a technologist: On his view, technology is a modality of Being whose essence is nothing technological (Heidegger,77a).

10 According to Margolis (1989), technology is "the biological aptitude of the human species for constituting, by alternative forms of equilibration, a world suited to a society of emergent selves or a society of such surviving selves adjusted, diachronically, to such a world. We understand one another for the same reason we survive as a species. Technology is the flowering of our biological endowment and is *incarnate* in it." (p.9) However, it is crucial to appreciate that since biology is a factical or ontical science, it leads to an ontical (or existent*iell*) interpretation of human being and hence, does not - *cannot* - correctly characterize man's existent*ial* essence, viz. `existence' or *ek-sistence* (that is, transcendence to Being *as such*).

Being; thus, technology, whose essence is *technē* as a way of Being (culminating in Enframing or *Gestellen*), is itself an epoch of Being. Interestingly, Margolis (1989) appears to endorse a similar position himself in maintaining that "we have not yet explained what the sense is in which the technologized self or its world *are* constructed and yet not *merely* constructed." (p.13) On this basis, Caws (1979) is led to maintain that "it is, I think, pure irreponsibility to claim that technology has made an *essential* difference in the condition of man as *knower* and *agent* [emphasis added]" (p.234) since "our basic relation to the world .. is constant." (p.231) Clearly, this position is consistent with the Heideggerian view that the existent*ial* (or concrete-universal[11]) structures of the human being (or *Dasein*) are existentially-fixed while its existent*iell* (or concrete-particular) manifestations are historically-variable (chapter 6). However, as stated above, it is crucial to appreciate that, for Heidegger (1993c), man as agent-knower (or artificer-interpreter) is not primordial (essential or `basic') but derivative of human being as *Dasein*, that is, transcendence (`existence' or *ek-sistence*). This follows from the fact that, on his view, man as agentive and knowing subject is *emergent from* man as unreflective, non-thematic being-in-the-world. As he states,

> man is never first and foremost man on the hither side of the world, as a `subject', whether this is taken as `I' or `We'. Nor is he ever simply a mere subject which always simultaneously is related to objects, so that his essence lies in the subject-object relation. Rather, *before all this*, man in his essence is ek-sistent into the openness of Being, into the open region that clears the `between' within which a `relation' of subject to object can `be' [emphasis added]. (p.252)

However, although man as subject is indeed emergent from man as *ek-sistence*, it does not follow thereby that the concept of a subject is by definition (that is, essentially or of necessity) anthropocentric. According to Heidegger (1967),

> until Descartes every thing at hand for itself was a `subject'; but now the `I' becomes the special subject, that with regard to which all the remaining things first determine themselves as such. Because - mathematically - they first receive their thingness only through the founding relation to the highest principle and its `subject' (I), they are essentially such as stand as something else in relation to the `subject', which lie over against it as *objectum*. The things themselves become `objects'. [However,] the word *objectum* now passes through a corresponding change of meaning. For up to then the word objectum denoted what one cast before himself in mere fantasy: I imagine a golden mountain. This thus-represented - an *objectum* in the language of the Middle Ages - is, according to the usage of language today, merely something `subjective'; for a `golden mountain' does not exist `objectively' in the meaning of the changed linguistic use. This reversal of the meanings of the words *subjectum* and *objectum* is no mere affair of usage; it is a radical change of Dasein, that is to say, of the lighting of the Being of beings on the basis of the predominance of the mathematical. (p.280)

Thus, for Heidegger (1977c), with the philosophy of Descartes, "the very essence of man itself changes, in that man becomes subject. We must understand this word *subiectum*, however, as the translation of the Greek *hypokeimenon*. The word names that-which-lies-

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11 Hence, the distinction between Heideggerian essences and *abstract* - that is, *worldless* - Platonic essences (ideas, forms).

before, which, as ground, gathers everything onto itself" and, as stated above, "this metaphysical meaning of the concept of subject has first of all no special relationship to man and none at all to the I." (p.128) According to Heidegger (1977b), with Descartes "the *ousia* (beingness) of the *subiectum* changes into the subjectness of self-assertive self-consciousness, which [in Nietzsche] manifests its essence as the will to will." (pp.79-80) As he goes on to state, "inasmuch as Descartes seeks [the] *subiectum* along the path previously marked out by metaphysics, he, thinking truth as certainty, finds the *ego cogito* to be that which presences as fixed and constant. In this way, the *ego sum* is transformed into the *subiectum*, i.e., the subject becomes self-consciousness. The subjectness of the subject is determined out of the sureness, the certainty, of that consciousness." (p.83) Crucially,

> all that is, is now either what is real as the object or what works the real, as the objectifying within which the objectivity of the object takes shape. Objectifying, in representing, in setting before, delivers up the object to the *ego cogito*. In that delivering up, the *ego* proves to be that which underlies its own activity (the delivering up that sets before), i.e., proves to be the *subiectum*. The subject is subject for itself. The essence of consciousness is self-consciousness. Everything that is, is therefore either the object of the subject or the subject of the subject. Everywhere the Being of whatever is lies in setting-itself-before-itself and thus in setting-itself-up. Man, within the subjectness belonging to whatever is, rises up into the subjectivity of his essence. Man enters into insurrection. The world changes into object. In this revolutionary objectifying of everything that is, the earth, that which first of all must be put at the disposal of representing and setting forth, moves into the midst of human positing and analyzing. The earth itself can show itself only as the object of assault, an assault that, in human willing, establishes itself as unconditional objectification. Nature appears everywhere - because willed from out of the essence of Being - as the object of technology. (p.100)

This position is supported by Lovitt (1977) who maintains that "what is, is no longer free to show itself directly in itself. It is, rather, either as subject or as object, always at the disposal of assertive self-consciousness, and hence of that mode of Being, the will to power, ruling in the latter." (p.106) As Heidegger states,

> man has risen up into the I-ness of the *ego cogito*. Through this uprising, all that is, is transformed into object. That which is, as the objective, is swallowed up into the immanence of subjectivity. The horizon no longer emits light of itself. It is now nothing but the point-of-view posited in the value-positing of the will to power .. The uprising of man into subjectivity transforms that which is into object. But that which is objective is that which is brought to a stand through *representing* [emphasis added]. (p.107)

According to Heidegger (1977c), "to represent means to bring what is present at hand before oneself as standing over against, to relate it to oneself, to the one representing it, and to force it back into this relationship to oneself as the normative realm." (p.131) Hence, "the original naming power of the worn-out word and concept `to represent': to set out before oneself and so set forth *in relation to oneself*. Through this, whatever is comes to a stand as object and *in that way alone receives the seal of Being* [emphasis added]." (p.132) Thus, with Descartes, representation comes to mean

> of oneself to set something before oneself and to make secure what has been set in place, as

> something set in place. This making secure must be a calculating, for calculability alone guarantees being certain in advance, and firmly and constantly, of that which is to be represented. Representing is no longer the apprehending of that which presences, within whose unconcealment apprehending itself belongs, belongs indeed as a unique kind of presencing toward that which presences that is unconcealed. Representing is no longer a self-unconcealing for ..., but is *a laying hold and grasping of* ... What presences does not hold sway, but rather *assault* rules. Representing is now, in keeping with the new freedom, a *going forth* - from out of itself - into the sphere, first to be made secure, *of what is made secure*. That which is, is no longer that which presences; it is that which, in representing, is first *set over against*, that which *stands fixedly over against*, which has the character of object. Representing is making-stand-over-against, an objectifying that goes forward and *masters*. In this way representing drives everything together into the unity of that which is thus given the character of object. Representing is *coagitatio* [emphasis added]. (pp.149-150)

On this basis, Heidegger is led to conclude that "the fundamental event of the modern age is the conquest of the world as picture. The word `picture' now means the structured image that is *the creature of man's producing* which represents and sets before. In such producing, man contends for the position in which he can be that particular being who *gives the measure and draws up the guidelines for everything that is* [emphasis added]." (p.134) In short, "when man becomes the primary and only real *subiectum*, that means: Man becomes that being upon which all that is, is grounded as regards the manner of its Being and its truth. Man becomes the relational center of that which is as such." (p.128) Thus, "what is, in its entirety, is now taken in such a way that it first is in being and only is in being *to the extent that it is set up [or Enframed] by man*, who represents and sets forth .. The Being of whatever is, is sought and found in the representedness of the latter [emphasis added]." (pp.129-130)

In summary, the relation between man (*Dasein*) and other phenomena (beings) can be shown to be marked by the following movement: *From* (i) man as gathered by subject (phenomenon) *to* (ii) object (phenomenon) standing over against man as (knowing) subject *to* (iii) product (phenomenon) as Enframed by man as (artificing) subject. The change in the interpretation of nature from self-limit*ing* (or self-Enfram*ing*) subject to other-limit*ed* (or other-Enfram*ed*) object is of critical importance since it allows for the establishment of essentialistic (that is, ahistorical) correspondence relations (or isomorphisms) between naturality and artificiality, the latter of which, by virtue of being artifactual, is other-limit*ed* (or Enframed). This follows from the fact that on such an interpretation both naturals and artificials are viewed as *finite* and *closed* (chapter 6) from the perspective of an *observing* subject, viz. the human being. Crucially, this subject-object relation is ahistorical since, as Jaspers (1965) maintains, Cartesian philosophy "claims to be detached from all *historical* reality: aiming at *timeless* truth in a world without tradition, it loses sight of history in order to become the existential void of this abstraction, the thinking individual as such [emphasis added]." (p.156) This position is supported by Levinas (1996) who maintains that

> in the indifference to time which the `subject-object' relation manifests there is something like a negation of the existential nature of knowledge. (p.13)

According to Heidegger (1971), "`Thing-in-itself', thought in a rigorously Kantian way, means an object that is no object for us, because it is supposed to stand, stay put, *without a possible before*: for the human representational act that encounters it [emphasis added]." (p.177) As a consequence of the ahistoricity of the subject-object relation, the *poiētic difference* (chapter 6) between naturals and artificials (as artifactuals), that is, the distinction in the way that naturals and artificials come-forth (become), is displaced (obscured) by the question concerning the nature (Being) - appearance (simulation) or reality (emulation, realization) - of the possible (functional, behavioural) isomorphism(s) between naturals and artificials, thereby rendering "strong" CEA possible.

It is appropriate at this point in the discussion to briefly consider the relation of subjects and objects to artificing (production). According to Risan (1996), "the possibility of *producing* [or artificing] .. objectivity, of *creating* distance [that is, separation] between the observer [or subject] and the observed [or object], is .. one of the central elements in all technoscience [emphasis added]." (p.17) In the context of artificiality as the sciences of the artificial (chapter 4) - specifically, artificial life (or A-Life) - "this separation is based on the construction of particular machines, the experimental apparatus. These machines presumably provide the necessary distance between the one who studies and the thing studied." (p.18) Significantly, he goes on to state that "when one focuses upon how a thing is to be constructed to be `subject-independent' (i.e. objective) one also, by necessity, explains the process by which the observer becomes `object-independent' (i.e. subjective)." (p.20) On his view,

> technoscience [that is, technological science], by means of certain machines (the experimental apparatus), the juridical idea of the trustworthy witness, and the separation of the subjects (of society) and the objects (of nature) constructs phenomena that appear as `pregiven' [since ontically autonomous]. These phenomena are fabricated in technical and social contexts that also establish *distance* between the researcher and an object of inquiry that thus appears to be `untouched by human hands'. (p.41)

Again, "when ALife researchers relate to their simulations they both reproduce and challenge the technoscientific distance. They reproduce the distance between the researcher and a scientific nature that (as all nature) appear to us as *pregiven*, despite the fact that they *construct* every single digital bit that they put into the experiment." (p.104) In this connection, it is significant to note that Risan follows Latour in positing the Society-Nature - that is, Culture-Nature or artificiality-naturality - distinction as "a central element of modernity." (p.63) However, as shown in chapter 6, the *classical* (that is, pre-modern) Greeks distinguished two kinds of *poiēsis* (coming-forth, bringing-forth) associated with Being, viz. *physis* (*autopoiēsis*, *self*-coming-forth) or the coming-forth of naturals and and *technē* (*allopoiēsis*, *other*-bringing-forth) or the bringing-forth of artifacts; hence, *with respect to the question concerning poiēsis (as opposed to that concerning noesis)*, the distinction between naturals and artificials, nature and society (or culture) is, in fact, pre-modern. Given that this distinction has existed in all epochs, it might appear to constitute a basic, that is, existent*ial*, structure of *Dasein*. However, this is not the case since, as stated previously, *Dasein* as the anthropic component, that is,

artificer-interpreter, is *emergent from* being-in-the-world. Crucially, this latter position appears to be contested by Risan (1996) who maintains that "in the actual process of *making* objective quasi-subjects, the boundary between the maker (the subject) and the made (the object) is .. blurred." (p.69) On this view, the artificer *as* artificer *is* a being-in-the-world. For example, in constructing computational ecologies[12], "an interface, then, a `face between', may be said to lie `between' the *human body* and the object to be perceived and acted on, but it does not lie between self and alterity [that is, `other']; it is part of the self .. When the interface has become part of the acting and perceiving self, then the simulation is alterity, it is the object to which the `I' relates." (p.81) This interpretation is consistent with Polanyi's (1966) notion of *interiorization*, viz.

> whenever we use certain things for attending *from* them to other things, in the way in which we use our own body, these things change their appearance. They appear to us now in terms of the entities to which we are attending *from* them, just as we feel our own body in terms of the things outside to which we are attending *from* our body. In this sense we can say that when we make a thing function as the proximal term of tacit knowing, we incorporate it into our body - or extend our body to include it - so that we come to dwell in it. (p.16)

The transformation *from* tool (or interface) regarded as *distal* (or `other') *to* prosthesis (or medium) regarded as *proximal* (or `self') is shown in Fig 7.1:

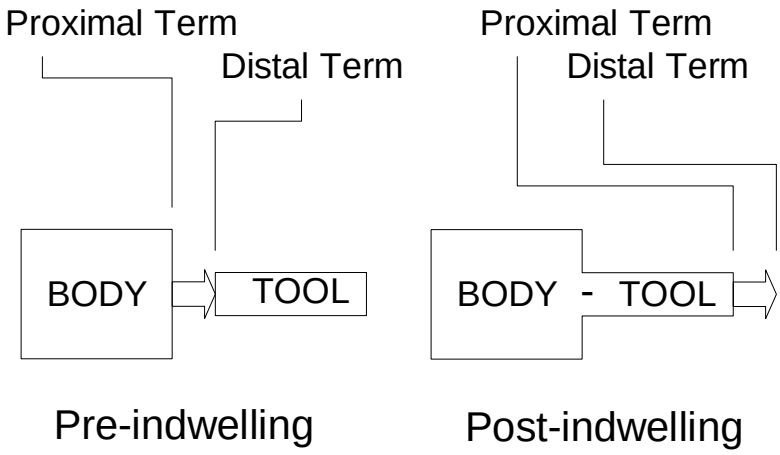

Fig 7.1 Tool→Prosthesis Transformation via Interiorization (Indwelling).

Risan goes on to state that "the boundary between the interface and the program `behind' the interface is fluid and dependent on the user. [Furthermore,] the interface of [a] simulation [is] often an integrated part of the simulation itself." Hence,

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12 Briefly, A-Lifeforms embedded in virtual environments, worlds, realities (chapter 4).

> when an [artificial world] is *in the making* [that is, when the artificer is *involved* in artifact-construction] the boundary between self and alterity can only be `subjectively' defined. The boundary is the actor's experienced and fluid action and perception front. Thus we cannot draw a clear-cut, `objective' boundary between self and alterity, as, for example, the skin of our bodies. There is no subjective-objective distinction [emphasis added]. (p.81)

> [However,] as the simulation becomes a ready-made product something important happens .. It seems that its *objectivity* becomes clearer. In the same movement, the *subjectivity* of the observer is stabilised. The fluid condition disappears as the skill-dependent interface-in-use becomes redundant. [Thus,] *during* the process of making [a] simulation .. there is no clear distinction between subjects and objects; neither is stable. However, the *result* of the process is, or I should rather say *may be*, a stable Nature (of objects) and a stable Society (of subjects). (p.84)

On this basis, Risan (1997) concludes that

> the objectivity of an ALifer observing a simulation is limited to the period during which the simulation is up and running. If we take a broader perspective, including a larger context and a longer time span, we see that, in the periods between the runs, the researcher is tweaking the parameters and rewriting code. Hence, a picture more like *co-evolution* - rather than that of an objective observer witnessing worlds behind screens - emerges. (p.6)

Consistent with this position, Okrent (1996) maintains that "the paradigmatic modes of being-in [that is, of concernful yet non-reflective coping] are working on something or producing something." (p.7) On such a view, technology is held to *emerge* socially through non-thematic processes, specifically via the `technological unconscious' (Feenberg,97) associated with `collective intentionality' (Searle,95).

There are (at least) three problems with the above position: First, it assumes that the subject-object relation is *essentially* ahistorical and merely epistemic (interpretative). This position is contested in section 7.2.2 on the grounds that *poiētic* relationality is ontic (productive) and historical yet correctly defined in subject-object terms; second, it ignores that phase of the artificing activity in which subjects and objects *are* `clear-cut', viz. the *incipience* associated with *design* and the (conscious) intentionalistic *choice* to construct an artificial world. As Dreyfus (1991) states, "deliberate attention and thus thematic intentional consciousness *can* .. be present .. in designing and testing new equipment [emphasis added]." (p.70) In support of this position, Caws (1979) maintains that "a technology [is] a *planned, purposive*, relatively complex, probably collaborative, structured sequence of praxes [emphasis added]." (p.235) Ferré (1988) goes somewhat further in postulating thematic (or cognitive) intentionality as a *necessary* condition for the Being of artificials (as artifactuals), viz. "whenever human beings intervene *deliberately* in the world of nature, they introduce artificiality [emphasis added]." (p.19) In clarification of this position he goes on to state that "an artifact is something *made* or *used* with `art' or intelligence [emphasis added]" (p.27), whereby `intelligence' is understood the `capacity for self-disciplined mental activity'; third, in focusing on issues of epistemology from an essentially ahistorical perspective, the question concerning the Being of artifacts, the unitary relation between Being and becoming (*poiēsis*) and the

poiētic difference (chapter 6) between naturals and artificials (as artifactuals) is obscured, thereby providing tacit support for the possibility of "strong" CEA. Furthermore, it is crucial to appreciate that although computational artificiality appears to co-evolve symbiotically with the human artificer, this co-evolutionary symbiosis is *ontical* (that is, existent*iell*): The basic *ontological* structures of "hard" (or pure) artifacts (chapter 6 and section 7.3), of which CEA will be shown to be an instance, and *Dasein* are fixed, viz. the former as ontologically-ontical and the latter as ontically-ontological. This distinction is critical since it entails that post-artificing - that is, post-symbiosis, when they have *become* (stable) autonomous objects - artifacts are *closed* systems (chapter 3), incapable of ontological emergence and operationally necessary (deterministic); naturals (such as human beings), by contrast, are intrinsically *open* and hence, capable of ontological emergence. In this connection, the following distinction between instrumentality, that is, Heideggerian functionality, and functionality *proper* due to Schirmacher (1983) is significant. On his view,

> machine technology is functional, not instrumental. From our standpoint this appears to be the same thing, but there is in fact a fundamental difference. *To fufill a function means to be oriented from within, to be defined by itself and its possibilities*. To be an instrument means, on the other hand, to be employed from without, to be employed for a purpose which has only a coincidental relation to the characteristic quality of the phenomenon itself [emphasis added]. (p.278)

Furthermore, "machine technology .. exhibits the characteristics of an indisputable *autonomy*; its functioning obeys *an intrinsic law, is clearly automatic*. This in no way makes technology the subject; it means technology is apparently no longer adequately describable within the *customary* subject-object relationship [emphasis added]." (p.279) The problem with this position is that the functionality of machines, while ontically autonomous and automatic (deterministic), is incipiently *other*-defined (that is, allopoietic) as opposed to self-defined (or autopoietic); in short, machines *as* artifacts are oriented from without[13] and their possibilities are in fact circumscribed potentialities. Artif*act* functionality reflects the *embedding* of artif*icer* intentionality, viz. *design* (chapter 6). Thus, while Schirmacher is correct in maintaining that the conventional (ahistorical, atemporal) Cartesian subject-object relation is inadequate for describing technology, this is not because technology is autonomous - that is, self-organizing or autopoietic - but because the Cartesian subject-object relation is statically-essentialist and hence, incapable of describing the essentially-historical *poiētic* relations between the anthropic component (artificer-interpreter), naturals and artificials (as artifactuals).

In concluding this section, it is worthwhile briefly responding to the view that in the movement *from* (i) man as gathered by subject (phenomenon) *to* (ii) object (phenomenon) standing over against man as (knowing) subject *to* (iii) product (phenomenon) as Enframed by man as (artificing) subject, the latter (that is, the subject) ultimately transforms itself into product, standing-reserve (*Bestand*). According to

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13 Here `from without' implies `by other' and not topological externality.

Margolis (1983), "Heidegger's thesis maintains, in part, that technological thinking leads to the result that man himself comes to be viewed reflexively as no more than a technical resource." (p.292) This position appears to be supported by Heidegger's (1977d) assertion that in modern physics, "the subject-object relation as pure relation .. takes precedence *over* the object and the subject, to become secured as standing-reserve" (p.173). Consistent with this position, Feenberg (1997) maintains that for Heidegger, "an `objectless' heap of functions replaces a world of `things' treated with respect for their own sake as the gathering places of our manifold engagements with `being'." (pp.2-3) He goes on to state that

> the craftsman brings out the `truth' of his materials through the symbolically charged reworking of matter by form. The modern technologist obliterates the inner potential of his materials, `de-worlds' them, and `summons' nature to fit into his plan. Ultimately, it is not man, but pure instrumentality that holds sway in this `enframing' (*Ge-stell*); it is no merely human purpose, but a specific way in which being hides and reveals itself *through* human purpose. (p.3)

This position is summarized by Ihde (1979) who maintains that, in *technē*-Enframing (*Gestellen*), "man is taken into the process of *ordering*." (p.109) This `taking-into' ultimately leads to what Baudrillard (1983) refers to as the `liquidation of referentiality', the referential in this case being the artificing subject. However, according to Adorno (1970),

> the fact that in [calculating] machines the mathematical correctness of the results and the causal-mechanical conditions of their functioning seem to have nothing to do with each other is due solely to a disregard for the *construction* [that is, *poiēsis*] of the machine. That construction demands some sort of connection between arithmetical propositions and the physical possibility of operating according to them. Without such a connection the machine would not produce correct answers, though that is the point [or *purpose*] of constructing it. The synthesis of the two is brought about *not by the machine* but certainly *by the consciousness of the constructor*. The machine *becomes* a `thing' [being] through the definitive establishment of the relation between logic and mechanics. But that relation disappears in individual operations. The work of the constructor is hardened in the machine [that is, machine-construction is characterized by a movement *from* contingency, possibility and openness *to* necessity, determinism, and closure]. The subject, which synchronized causal-mechanical procedure [that is, *production*] with states-of-affairs [that is, *interpretation*], abstracts itself from the machine like the God of the Deists from his creation. [Crucially, this] unmediated dualism of reality [mechanism] and mathematics [interpretation] come about historically through a *forgetting*, viz. *the withdrawal of the subject* [emphasis added]. (pp.62-63)

Consistent with this statement and contrary to the above interpretations of his position, Heidegger (1977a) maintains that "precisely because man is challenged more originally than are the energies of nature, i.e., into the process of ordering, *he never is transformed into mere standing-reserve* [that is, a technical resource]. Since man drives technology forward, *he takes part* in ordering as a way of revealing [emphasis added]." (p.18) This point is of crucial significance since it undermines post-modern interpretations of his position - such as that due to Risan (1996) - which attempt to classify it as ontologically-eliminative with respect to subjectivity: For Heidegger, *technē*-Enframing (*Gestellen*) does not entail *elimination* of the subject but its *redefinition* in terms of organization and

control as opposed to observation and perception. In what follows, a temporal-historical framework is described in which the phenomenological subject (anthropic component) is defined in terms of ontic (productive, organizational) and epistemic (interpretative, observational) relations to beings.

7.2.2. Ontic and Epistemic Relationality

In chapter 6, a *poiētic difference*[14] was established between *physis* (naturality) and *technē* (artificiality) and it was shown that the way in which Being *as such* (*physis* as *poiēsis*) stands to naturals (*physis* as *autopoiēsis*) is not isomorphic with the way in which *Dasein* stands to artificials (*technē* or *allopoiēsis*). In section 7.2.1, it was maintained that at critical points in artificing - specifically, during artifact-*incipience* or *design* - *Dasein* becomes the *anthropic component* or human artificer-interpreter whose ontology was shown to be both historical and thematic (reflective, conscious). However, the existential structure of the anthropic component cannot be disclosed without describing its phenomenological relationality, that is, the way in which it ontically (productively) and epistemically (interpretatively) relates to phenomena (naturals and artificials); this follows from the fact that the anthropic component emerges in *poiēsis* (coming-forth, bringing-forth) as *technē* (artificing)[15] and *poiēsis* is a relational concept (chapter 6). The aims of this section are threefold: First, to briefly clarify the concept of a relation and its two basic ontological (as opposed to various ontical) kinds; second, to examine the link between ontical *a priority*, Being and Temporality by way of a consideration of the notion of `givenness'; finally, to present a framework of *poiētically*-historical (prior, posterior) ontic (productive, organizational) and epistemic (interpretative, observational) relations between phenomena (naturals and artificials) and the anthropic component.

The *Oxford Companion to Philosophy* (1995) defines relations as "ways in which things can stand with regard to one another" and distinguishes between the two ontological kinds, viz. *internal* and *external*, as follows:

> If one item, *x*, stands in some relation, *R*, to another item, *y*, but neither its identity nor its nature depends on this being the case, *x* is *externally* related to *y*. If *x* could not be the same item, or an item

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14 That is, a difference in becoming (coming-forth, bringing-forth) *entailing a difference in Being* since (i) Being and becoming stand in essential unitary relation and (ii) the *poiētic difference* is grounded in the *ontological difference* between beings and Being *as such*.

15 Following Dreyfus (1991), it is argued that *Dasein* becomes the Cartesian subject (or ego) in *poiēsis* (coming-forth, bringing-forth) as *physis* (science). However, the Cartesian subject is not a historical being; for this reason, it is necessary to adopt some form of hermeneutic Cartesianism. In this study, the notion of the hermeneutic Cartesian subject has been subsumed by the concept of the anthropic component via the scheme of ontic and epistemic relations described herein.

> of the same kind without standing in relation *R* to *y*, the relation is *internal*.

There are (at least) three points to note in connection with the above definition: First, it is *ontical* (metaphysical) in that it defines relations in terms of the various ways in which *things*, that is beings (*Seiendes*), stand with regard to one another. Hence, the way in which beings stand with Being *as such* (*Seyn*) is not addressed on this definition[16]; second, the internality (or internal-ness) of an internal relation is defined in terms of *contextuality* (situatedness) and *constitutedness*: While this is consistent with the concrete, historical existentiality of ontological *Dasein*, viz. being-in-the-world (chapter 6), the question of *relata* ontology - for example, ontically-subjective (first-person, experiential) or ontically-objective (third-person, non-experiential) - remains open in an ontical context. On this basis, the following table of oppositions can be constructed:

		Relationality	
		Internal (Constitutive)	*External (Non-Constitutive)*
Relata Ontology	*Experiential (Ontically-Subjective)*		
	Non-Experiential (Ontically-Objective)		

Table 7.1 Relationality and Relata-Ontology Permutations.

It is important to appreciate that external-relationality and non-experientiality of *relata* are traditionally associated with metaphysical realism while internal-relationality and experientiality of *relata* are associated with idealism. In chapter 6, Heidegger's position was described as *pluralistically-realist*: On his view, *Dasein* is internally-related yet neither experiential (ontically-subjective) nor non-experiential (ontically-objective) while the derivative or *emergent* Cartesian ego is externally-related and experiential (ontically-subjective)[17]; third, according to Harris (1965),

> a relation is the way in which one term stands to another; but they cannot stand to each other in any relation unless there is some matrix, some context, some `respect' in which they are related. Moreover, they must be part of this common matrix or context. (p.459)

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16 This is consistent with Heidegger's insistence that the (metaphysical) tradition does not regard Being *as such* (*Seyn*) as a meaningful concept (chapter 6).

17 This position contrasts with that of panexperientialists such as Whitehead (1978) and Griffin (1998) who present a monism in which the relationality of experiential events (or actual occasions) historically (that is, temporally) alternates between internal and external forms.

Since *ontological* contexts cannot be constructed atomistically[18] (chapter 6), relations cannot be constructed and hence, must emerge as *gestalts* from Being *as such* (*Seyn*). This position is supported by St.John (1974) who, in an *ontical* context, raises the following important question, viz.

> why is the [scientific] method operated on the assumption of the ultimate facts being particulate, that a thing's *parts* are ultimate and more real than the thing itself ? This is a pure assumption. (p.76)

Following Whitehead, he identifies this position with the fallacy of misplaced concreteness, viz. "the habit of abstracting a part and ascribing to it the sort of reality that belongs to the whole. In this case the measurable and *physically* observable is taken to be the only reality objectively speaking, so that values become purely subjective." (p.83)[19] However, it is crucial to appreciate that ontical contextualism fails to address the question concerning the historicity of relations, that is, the way in which one term *comes-to-stand* to another; in short, the *poiēsis* (coming-forth) of relationality as such is ignored on such schemes[20].

In the preceding discussion, it has been argued that *Dasein* as being-in-the-world is internally-related while the Cartesian subject (or ego) is externally-related and ontically-subjective. However, as stated previously, the anthropic component or human artificer-interpreter is historical and thematic. Thus, the anthropic component of *technē*

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18 In *Tractatus Logico-Philososophicus* (1921), Wittgenstein defines the world in terms of a set of atomic facts which can be expressed in logically independent (that is, acontextual) propositions. However, the attempt at *constructing* contexts using such atomic primitives gives rise to the Frame Problem which Dreyfus (1992) describes as the problem of determining "(1) how to restrict the class of possibly relevant facts while preserving generality, and (2) how to choose among possibly relevant facts those which are actually relevant." (p.259) According to Dreyfus (1998), "what counts as relevant depends on the current context. But how we classify the current context itself depends on the relevant information. This circularity does not seem to be a problem amenable to successive approximations since the problem is how to get started at all." (p.209) For example, "(1) if in disambiguation the number of possibly relevant facts is in some sense infinite so that selection criteria must be applied before interpretation can begin, the number of facts that might be relevant to recognizing a context is infinite too. How is the computer to consider all the features such as how many people are present, the temperature, the pressure, the day of the week, and so forth, any one of which may be a defining feature of some context ? (2) Even if the program provides rules for determining relevant facts, these facts would be ambiguous, that is, capable of defining several different contexts, until they were interpreted." (Dreyfus,92;p.220) Crucially, "since facts are not relevant or irrelevant in a fixed way, but only in terms of human purposes, all facts are possibly relevant in some situation." (p.257) However, "since a computer is not in a situation .. it must treat *all* facts as possibly relevant at all times." (p.258) The end result is a "a regress of more and more specific rules for applying rules of more and more general contexts for recognizing contexts." (p.226)

19 In fact, a commitment to atomism - and hence, a metaphysics of external relations - transcends the subjectification of values: on this view, "values are *impossible* .. for particulate facts lose all the contextual significance required for evaluation [emphasis added]." (p.76)

20 Heidegger (1959) has investigated the notion of relational `standing' in some detail and, as shown in chapter 6, maintains that it is marked by two distinct yet intimately connected phases, viz. (1) `dynamic' (coming-to-stand, emerging) and (2) `static' (standing, enduring presencing).

(artificing) stands somewhat in between the *Dasein* of *praxis* (technology)[21] and the Cartesian subject of *theoria* (science) as shown in the following table of comparisons:

Being-in-the-world	*Anthropic Component*	*Cartesian Subject*
Praxis (Technology)	*Technē* (Artificing)	*Theoria* (Science)
Internally-related Historical Ontological	Internally-Related Historical Ontically-Subjective	Externally-related Ahistorical Ontically-Subjective

Table 7.2 Comparison of Dasein, Anthropic Component and Cartesian Subject

In this context, it is important to appreciate that the identification of the human artificer-interpreter as anthropic *component* implies a *systemic* (chapter 3) conception of human being which is supported by the following facts: First, according to Heidegger, *Dasein* is unique among beings (*Seiendes*) in that it has the understanding of Being (*Sein*) as its essence (chapter 6). *Dasein* is the `clearing' (`site', *Da*) within which beings come to presence and are interpreted irrespective of whether they come forth in the mode of *physis* (natural, *autopoiētic*) or *technē* (artificial as artifactual, *allopoiētic*). Identifying the human artificer-interpreter as a (systemic) *component* emphasizes the ontological *necessity* of *Dasein* relative to beings (natural and artificial) with respect to the question concerning their *poiēsis* (that is, becoming or *poiētic* Being). It is crucial to appreciate, however, that this does not entail support for ontological constructivism since, as will be seen in what follows, the systemic relations between the anthropic component and phenomena (naturals and artificials) are *essentially* (that is, ontologically-existent*ially*) historical and only *contingently* (that is, ontically-existent*ielly*) causal. The historical relationality of the anthropic component *contextualizes*, that is, provides a background for understanding, organization-production (ontic) and observation-interpretation (epistemic) relations and is consistent with Heidegger's (1982) assertion that Time (Temporality, historicity) is the `horizon' (or contextual background) of Being; second, the existence of a component *entails* (that is, necessitates) the existence of (1) other

21 The association of technology with *praxis* rather than *technē* is consistent with Heidegger's (1977a) assertion that "the essence of technology is by no means anything technological." (p.4) As shown in chapter 6, this essence is *epistemē* (knowing) in the mode of *circumscription* or teleological *a priority*, that is, design and determinism; hence, the essence - which here means *incipience* since Being and becoming (or *poiēsis*) stand in essential, unitary relation - of technology lies in *closure* and not in instrumentality (or functionality), that is, *praxis*. However, (non-incipient) technology is correctly linked to *praxis* since the latter can be associated with the contextual, equipmental coping of being-in-the-world. (As stated in section 6, this connection is not necessary since *Dasein* is not primordially defined in *praxical* terms but in terms of *ek-sistence*, that is, *transcendence* to Being *as such*.) Thus, in this study, *technē* is associated with that which lies between occurrent theoretical activity (science) on the one hand, and involved practical activity (technology) on the other, viz. *artificing*.

components[22] and (2) a part-whole relation[23] which, if interpreted historically, provides a basis upon which to examine the ontic and epistemic relations between parts (substrata) and wholes (products) as mediated by artificer-interpreters (productant-interpretants[24]). This is significant because it enables natural emergence to be distinguished from artificial (as artifactual) emergence: Systemic phenomena are wholes whose parts interact either (i) *in-order-to* perform some function (teleologically *a priori*, necessary or artifactually-designed systemicity) or (ii) *thereby* performing some function (teleonomically *a posteriori*, contingent or naturally-emergent systemicity).

In chapter 6, the artificial (as artifactual) was briefly identified as the ontically *a posteriori* (or `made') relative to the anthropic component and in what follows a framework of ontic and epistemic relations is defined in terms of *poiētic* priority and posteriority, that is, productive (organizational) and interpretative (observational) historicity. Preparatory to the presentation of that framework, it is worthwhile briefly examining the connections between the notion of ontical *a priority* (or `givenness'), Being and Temporality. The *Oxford Companion to Philosophy* (1995) defines `the given' in epistemological terms as "what is immediately presented to consciousness." However, Whitehead (1978) maintains that

> for rationalistic thought, the notion of `givenness' carries with it a reference beyond the mere data in question. It refers to a `decision' whereby what is `given' is separated off from what for that occasion is `not given'. This element of `givenness' in things implies some activity procuring limitation. The word `decision' does not here imply conscious judgement, though in some `decisions' consciousness will be a factor. The word is used in its root sense of a `cutting off'. (pp.42-43)

He goes on to state that "where there is no decision involving exclusion, there is no givenness. For example, the total multiplicity of Platonic forms is not `given'." (p.43) This position is problematic because there is an ontological difference (chapter 6) between beings-as-a-whole - which includes *both* existents (actual occasions) *and* subsistents (Platonic forms) - and Being *as such* (*Seyn*). According to Whitehead,

> an actual entity [that is, being or potentiality for process] arises from decisions *for* it, and by its very existence provides decisions *for* other actual entities which supersede it .. The real internal

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22 This follows from the fact that a distinction between systems and components is only meaningful (and possible) if the relation between them is one-many. Additionally, it is not *necessary* - and, following Heidegger, is not the case - that the ontology of components is universal.

23 If emergent ontological pluralism is true, as is argued in this thesis (chapter 6), then part-whole relations must hold *vertically*, that is, between levels in a hierarchy (chapter 3); hence, the association of parts with substrata (level *m*) and wholes with products (level *n*, where $n>m$). However, if ontological monism is true then part-whole relations must hold *horizontally*.

24 The concept of an interpretant is here taken to be synonymous with that of an interpreter; the technical meaning of this term in Peircean semiotics, viz. as a "proper significate effect" (Cobley,97; p.23), is not intended.

> constitution of an actual entity progressively constitutes a decision conditioning the creativity which transcends that actuality. (p.43)

However, this characterization of "*synthetic* `givenness'"[25] (p.44) is problematic since it only addresses *ontical-givenness*, that is, the givenness of beings (*Seiendes*); the *ontological-givenness* associated with the existential movement between Being *as such* (*Seyn*) and beings is ignored. Crucially, on Whitehead's view, "`potentiality' is the correlative of `givenness'. The meaning of `givenness' is that what *is* `given' might not have been `given'; and that what is *not* `given' *might have been* `given'." (p.44) This position is supported by Elstob (1997) who maintains that

> the universe had a start - the Big Bang say. Or the universe has always existed and always will. In either case, there is a given [viz. the ontical universe], and this givenness implies [the possibility of] a condition of non-givenness when the given was not given. On this view there has definitely been one occasion [or event] of givenness. The question is, if there has been one occasion of givenness, why not more than one[26]? (p.1)

However, Whitehead (and Elstob[27]) holds that "the ontological principle declares that every decision is referable to one or more actual entities [or beings], because in separation from actual entities there is nothing, merely nonentity - `The rest is silence'." (p.43) Clearly, on his view, nothing is static (void). Yet, this position is readily shown to be problematic once (i) the ontological difference between beings and Being and (ii) the unitary relatedness of Being and becoming is acknowledged: Since Being is not a being, it must, in some sense, *be* the `same' as nothing and to the extent that Being has both static and dynamic aspects, nothing must also have such aspects, thereby entailing a *dynamic* interpretation of the nothing.

It is crucial to appreciate that what is given *is*, that is, partakes of Being. Furthermore, to the extent that idealism is false and (some variant of) realism true, the given is not

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25 It is interesting to note in passing that to the extent that the given is the ontically *a priori*, it follows that synthetic givenness denotes ontically synthetic *a priority* which contrasts with Kant's epistemic synthetic *a priori*.

26 Silberstein (1998) makes a similar point in connection with the possibility of emergentism, viz. "if quantum mechanics shows that emergence within physics is a coherent position, then it is also coherent to postulate the existence of other emergent properties, such as those useful for explaining consciousness and cognition." (p.475) Again, "it would be strange indeed if the universe only exhibits emergence at the `level' of quantum phenomena and consciousness respectively, while the rest of the universe remains pretty much as conceptualized by classical physics. It is more likely that emergence is ubiquitous and that the universe is far more intertwined and complex than the standard division of the sciences would lead us to believe." (p.480)

27 The justification for establishing a link between the thought of Elstob and that of Whitehead derives from reference to the published writings associated with the former. In more recent unpublished writings, Elstob has distanced himself somewhat from his original position, particularly with respect to the interpretation of nothing and appreciation of the ontological difference between beings and Being *as such*.

given (*to* self) *by* the Cartesian subject (or ego). The existential facticity of a given that is not artifactual therefore implies a natural given-*ness* and hence, a link between the given as an ontical being (*Seiende*) and Being *as such* (*Seyn*) as (primordial) giv*er*[28]. In this connection, it is significant to note that, for Heidegger (1993c), "`gives' names the essence of Being that is giving, granting its truth. The self-giving into the open, along with the open region itself [viz. the clearing or *Da* that is *Dasein*], is Being itself." (p.238) However, Ihde (1979) maintains that

> beings as such are never simply *given*: they appear or come to presence in some definite way which is dependent upon the total field of revealing in which they are situated. Preliminarily it is important to note that the field or opening in which things are `gathered' is, in a sense, given. It is given historically as an epoch of being. (p.105)

These epochs are ways in which the existent*ial* structure being-in-the-world (that is, the *gestalt* structure of *Dasein*, involvement and World) is existent*ielly* instantiated and it is relative to these *gestalts* that the appearance (that is, emergence) of beings occurs. The grounding of ontical givens (beings, *Seinedes*) relative to *epochal* ontological givens (Being, *Sein*) establishes a connection between ontical *a priority*, Being and Temporality. This position is supported by Hofstadter (1982) who maintains that "if being is understood by us, then being has to be *given* in some way to us. If understanding-of-being is possible, then the givenness-of-being must be possible; and if we are to understand the former possibility, then we must gain insight into the latter possibility [emphasis added]." In this connection it is crucial to appreciate that "all that is given is given only as projected upon a horizon." (p.xxiv) Furthermore,

> being is itself the horizon for beings: they are encountered and understood only as they are projected upon their own being as horizon. But being itself requires another horizon to be projected upon if it is to be understood as being [and] it is *time* which is this horizon upon which being itself is projected. [Crucially,] being can be given only as projected upon this fundamental horizon, the transcendental horizon. Temporality. Therefore, being is understandable only by way of time. If we are to think being and speak of being, and do it properly without confusing being with any beings, then we have to think and speak of it in temporal concepts and terms. (p.xxv)

Hence, as Kovacs (1990) states, for Heidegger, "Temporality is considered as the meaning of Being itself. Time was viewed as the `designer' of the regions of Being (temporal and atemporal)." (p.52) Yet, Heidegger's assertion that the horizon of Temporality - which he identifies with the existential care structure of *Dasein* (chapter 6) - is an ultimate is problematic since, as stated previously, *Dasein* is not the *giver* of ontical Being (that is, existence) to beings; in short, ontical nature *exists* - without ontological Being - independently of *Dasein*. Additionally, the possibility of a *natural*

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[28] It might be argued that, as ultimate concept, that is, groundless ground or abyss (chapter 6), Being *as such* (*Seyn*) is itself `given'. Although this is correct, the character (or essence) of the `givenness' of Being *as such* is radically distinct from all other kinds of `givenness'. This follows from the fact that the `givenness' *of* Being *as such* is a `givenness' *from*, *of*, *by* and *for* Being *as such* (chapter 6); in short, *Seyn* is both giv*en* and giv*er*.

time which, according to Dreyfus (1991), "need not be occurrent, yet [be] some sort of pure sequential ordering of events" (p.259), undermines the claim for *anthropocentric* Temporality as the (interpretative) horizon for Being[29]. However, while (anthropocentric) Temporality may be invalid as an existentially analytical horizon in the *distal* context of the *ontological* difference between beings and Being *as such*, it remains valid in the *proximal* context of the *poiētic* difference between natural and artificial (as artifactual) beings: This follows from the fact that *Dasein* as anthropic component historically mediates the distinction in becoming (coming-forth, bringing-forth) between *physis* or naturality and *technē* or artificiality (chapter 6).

It is appropriate at this point in the discussion to present the framework of *poiētically*-historical (prior, posterior) ontic (productive, organizational) and epistemic (interpretative, observational) relations between phenomena (naturals and artificials) and the anthropic component (artificer-interpreter). The philosophical notion of priority (and posteriority) is well established in Western metaphysics. Perhaps its most famous conceptualization is due to Kant who followed Leibniz in distinguishing rational (or *a priori*) truths from empirical-factual (or *a posteriori*) truths. Angeles (1981) describes the Kantian distinction as follows: *a priori* refers to "that which precedes .. independent of sense experience" while *a posteriori* denotes "that which follows after", specifically, "from [or out of] sense experience". Crucially, Hamlyn (1967) maintains that "the distinction between the a posteriori and the a priori comes to be a distinction between what is derived from experience and what is not, *whether or not the notion of the a priori also has the notion of demonstration in terms of cause or reason associated with it* [emphasis added]." (p.140) For Kant, that which determines priority and posteriority is *experience*, which means *perception*; hence, as Heidegger has argued, Kant remains firmly embedded within the Cartesian subjectivist tradition (chapter 6). A list of Kantian oppositions between *a priority* and *a posteriority* is shown in Table 7.3:

A Priori	*A Posteriori*
Necessary	Contingent
Certain	Probable
Definitional	Empirical
Deductive	Inductive
Innate	Experienced
Intuitive	Observed

29 In fact, it is unclear whether Heidegger is justified in maintaining that Temporality is the (final) horizon of Being given the problem of *eternity*. According to Kovacs (1990), "the problem of the eternity of God .. is not elaborated by Heidegger. He prescinds from the religious, theological meaning of eternity and of time (as well as of resolve). [*Being and Time* (1927)] elaborates the nature of the temporality of There-being; *it does not consider, in this context, the notion of eternity as atemporality (timelessness).* The existential analysis .. leaves open the possibility of a philosophical reflection regarding the eternity of God. Heidegger says that the philosophical `construction' of the eternity of God could be understood as a more original and `endless' temporality [emphasis added]." (p.111)

Table 7.3 Kantian Oppositions Between *A Priority* and *A Posteriority* (Angeles,81).

On the basis of the above statements, it might appear, as Hamlyn maintains, that "the distinction between the a priori and the a posteriori has always been an *epistemological* one; that is to say, it has always had something to do with knowledge [emphasis added]." (p.140) However, that this is not *necessarily* the case is readily established by considering Aristotle's classification in the *Categories* (350 BC) of the different kinds of priority, viz. (1) *temporal* (based on historical relation), (2) *sequential* (based on existential relation), (3) *ordered* (based on axiomatic relation), (4) *honorific*, and (5) *causal* (based on genetic relation). If, as Heidegger maintains, Being and Time (or Temporality) are essentially and unitarily related then (1) must be *ontological*. Furthermore, and in an ontical context, (5) is clearly ontological[30]. Interestingly, Hamlyn implicitly concedes this point in maintaining that "according to Aristotle, *A* is prior to *B* in *nature* [that is, Being] if and only if *B* could not *exist* without *A* [existing]; *A* is prior to *B* in *knowledge* if and only if we cannot *know B* without knowing *A* [emphasis added]." He goes on to state that

> it is possible for these two senses of `prior' [viz. epistemic and ontic] to have an application in common; substance, for example, is prior to other things in both of these senses and in others. *It follows that to know something from what is prior is to know what is, in some sense, its cause* [emphasis added]. (p.140)

The above statement is of crucial significance in the context of this study: According to Heidegger, function - and hence, functionalism, computationalism and CEA - is grounded in substance (chapter 6); consequently, substance is to attribute as function is to property. To the extent that attributes do not arbitrarily attach to substances but are, in some sense, relative-to-substance-kind, it follows that functional properties do not arbitrarily attach to functions but are, in some sense, relative-to-function-type. There are (at least) two corollaries of this fact: (1) functional properties (posterior) could not *exist* nor be *known* without the existence and knowledge of function (prior); (2) the ontology of functional properties is *circumscribed* (categorially-closed, bounded) by the ontology of functions since the latter are *causal* relative to the former. The implication is that substrate (substratum) ontology *determines* emergent (product) ontology in the case of artificials (as artifactuals). In section 7.3, it is argued that this entails bounded (closed) *epistemological* emergence (chapter 3) in finite computational systems (Cariani,89) (Cariani,91), unbounded (open) *epistemological* emergence in infinite computational systems (Ali,98a), and categorial-closure to *ontological* emergence in both finite and infinite computational systems. This latter fact is of critical significance since ontological

30 This position is supported by Aquinas who, in *Summa Theologica* (Part I, Question 2, Article 2), maintains that "demonstration can be made in two ways: One is through the cause, and is called `a priori' and this is to argue from what is prior absolutely. The other is through the effect, and is called a demonstration `a posteriori'; this is to argue from what is prior relatively only to us."

emergence is necessary if CEA is to solve the category problem (section 7.4): Since ontological emergence is impossible in CEA, the latter cannot solve the category problem in which case "strong" CEA is impossible.

As stated in section 7.2.1, the framework of ontic (productive, organizational) and epistemic (interpretative, observational) relations between phenomena (naturals and artificials) and the anthropic component (human artificer-interpreter) is essentially *poiētic*. This follows from the fact that such relations are (1) *historical* and (2) concerned with the way (mode) in which naturals and artificials (as artifactuals) *become*, that is, come-forth or are brought-forth; hence, a historical - *and, thereby, ontological* - conception of priority and posteriority grounded in Aristotelian metaphysics as interpreted by Heidegger (chapter 6) is adopted in this study. The framework is shown in Table 7.4:

		Ontical Relationality of Phenomenon with respect to Anthropic Component	
		A Priori	*A Posteriori*
Epistemic Relationality of Phenomenon with respect to Anthropic Component	*A Priori*	(1)	(2)
	A Posteriori	(3)	(4)

Table 7.4 Historically-defined ontic and epistemic subject-object relations.

Ontical *a priority* denotes givenness (*to* the anthropic component), ontical *a posteriority* denotes made-ness (*by* the anthropic component); epistemical *a priority* denotes specification (*by* the anthropic component), epistemical *a posteriority* denotes interpretation (*by* the anthropic component). Naturality can be *poiētically*-differentiated from artificiality (as artifactuality) by applying the phenomenological framework described above to the triadic making relation (productant-substratum-product) defined in chapter 6. On this basis, the following classification of naturals and "hard" (or pure)[31] artifactuals emerges:

Naturality		*Artificiality*	
Substratum	*Product*	*Substratum*	*Product*
(3)	(3)	(2)	(4)

Table 7.5 Natural-Artificial Classification.

[31] The meaning of this term is defined in section 7.3.

There are (at least) three possible objections to the above scheme: First, it might be argued that it tacitly assumes ontical and epistemical relations to be analytically separable, a position apparently undermined by Heidegger's endorsement of the Parmindean-Heraclitean maxim concerning the essential, unitary relatedness of *physis* and *logos* (chapter 6), viz. Being is knowing and knowing is Being (chapter 1)[32]. If this criticism is valid then to observe or interpret *is* to organize or produce and visa versa, in which case epistemic and ontic relations become interchangeable. However, it is crucial to appreciate that Heidegger's position, while correct, is formulated in a specific context, viz. *Dasein* as involved, coping, non-thematic being-in-the-world; when the *unity* of being-in-the-world becomes a *duality* of subject (artificer-interpreter) and object (phenomenon), the ontical-epistemical duality emerges. Hence, the above criticism is not valid since it applies in an *ontological* context prior or posterior to when the human being (or *Dasein*) is the anthropic component.

Second, throughout this study epistemic relationality has been defined as observational-interpretative, thereby implying a received-ness. While this is consistent with the notion of epistemic *a posteriority*, defining epistemic *a priority* in such terms appears incorrect and this position is supported by the explicit characterization of epistemic *a priority* as specification in the above statement. In response to this semantic criticism, it is argued that although epistemic relationality, posterior *and* prior, *is* observational or interpretative, the concept of observation in which it is grounded differs markedly from the conventional notion associated with perception[33]. In order to both understand and justify the concept of observation as presented herein, it is necessary to briefly examine its etymology. *The Oxford English Dictionary, Second Edition* (1989) provides the following definition of the word *observe* and the prefix *ob*-, viz.

> observe: L. *observāre*, to watch, look towards, look to, attend to, pay attention to, guard, keep. "To say by way of remark, to remark or mention in speech or writing." "To keep, preserve; to retain."
>
> ob-, *pref.* The Lat. prep. *ob* `in the direction of, towards, against, in the way of, in front of, in view of, on account of.'

On the basis of the above definitions, and in the context of this study, it is maintained that *a priori* observation must be understood in terms of (1) *intentionality* (aboutness, directedness, teleology) and (2) *circumscription* (closure, containment, preservation). This follows from the fact that preservation in writing (that is, some form of inscription)

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32 According to Sikka (1997), "in order to conceive, Dasein must receive, so there is a given, but the givenness of that given lies in the inwardness of Dasein which is also the inwardness of all things. It lies in the unity, the essential belonging together, of being and thinking, a unity that occurs in the being of Dasein. This is the unity of being itself, bestowing being (presence) at the same time as it opens the space of Dasein." (p.158)

33 Runes (1960) defines observation as "the act of becoming aware of objects through the sense organs and of interpreting them by means of concepts."

points to the original meaning of *logos* (discourse) as `gatheredness' or `collecting collectedness' (chapter 6). However, it must be noted that under *technē*-Enframing (*Gestellen*), *logos* becomes *kategoria* and hence, inscription becomes circumscription. This shift in meaning is supported by the fact that the epistemic is the epistemological, that is, the *logos* in the *epistemē*: To the extent that the essence of *technē* can be identified with *epistemē*, and the latter with teleological *a priority* (chapter 6), it follows that epistemic (or epistemological) relationality - *in the context of the phenomenological-ontology of the anthropic component* - means *design*, that is, a movement from possibility to mechanistic (deterministic, necessary, closed) potentiality-actuality. In this sense, epistemic relationality has *ontological* significance.

Third, it might be argued that artificially (as artifactually) emergent phenomena (products) should be characterized as (3), that is, epistemically *a posteriori* and ontically *a priori*, since the *epistemological* emergence (epistemic *a posteriority*) of artificials *entails* a phenomenal givenness *to* the anthropic component. However, this inference is incorrect for (at least) three reasons: First, it conflates Kantian epistemic givenness with Heideggerian ontological givenness; second, epistemology does not entail ontology. If anything, and following Heidegger, the reverse must be the case; finally, as will be seen in section 7.3, closure to ontological emergence in "hard" (or pure) artificials is *entailed* by the fact that such phenomena are artifactual, that is, ontically *a posteriori* relative to the anthropic component.

7.3. The Phenomenology of Artificiality

The presentation in this section has the following aims: (1) clarify the distinction between "hard" (or pure) and "soft" (or impure) artificials (as artifactuals) using the phenomenological framework described in section 7.2; (2) identify the ontology of computers (and CEA) as the paradigmatic instance of "hard" artificiality; (3) show that the *poiētic difference* between naturals and artificials holds for both designed (or top-down) and emergent (or bottom-up) "hard" artificiality; and (4) critically examine the phenomenon of computational emergence (chapter 3) with a view to determining whether ontological emergence is possible in CEA.

7.3.1. "Hard" and "Soft" Artificiality

In this section, the distinction between "hard" and "soft" artifacts introduced in chapter 6 is clarified in terms of the phenomenological framework of ontic (productive) and epistemic (interpretative) relations described in section 7.2. It is crucial to appreciate at the outset that the distinction between "hard" and "soft" artificials (as artifactuals) does not reproduce (that is, is not identical to) the distinction between hardware and software in computer science; in fact, the former distinction stands in *inverse* relation to the

latter[34]: The hardware-software duality is a duality of matter (physics) and form (logic, function) and hence, defined in terms of *substantiality*. The "hard"-"soft" artifact distinction, by contrast, is defined in terms of the *poiētic* Being of form and matter in "hard" and "soft" artifacts respectively. As will be seen in what follows, "hard" artifacts are *pure* artifacts because *both* matter *and* form are artifactual (made), whereas "soft" artifacts are *impure* artifacts since *either* matter *or* form are natural (given); hence, the "hard"-"soft" distinction is defined in terms of *artifactuality*. However, in order to establish this distinction, it is necessary to re-examine the matter-form relation.

According to Heidegger (1982),

> if we bring to mind the productive comportment in its full structure we see that it always makes use of what we call *material*, for instance, material for building a house. On its part this material is in the end not in turn produced but is *already there*. It is met with as a being that does not need to be produced. In production and its understanding of being, I thus comport myself toward a being that is not in need of being produced. I comport myself toward such a being not by accident but corresponding to the sense and essential nature of production, so far as this production is always the producing of something *from* something [that is, *ex nihilo nihil fit*]. What is not in need of being produced can really be understood and discovered only within the understanding of being that goes with production. In other words, it is first of all in the understanding of being that belongs to productive comportment and thus in the understanding of what does not need to be produced that there can grow the understanding of being which is extant in itself *before* all production and *for* all further production. It is this understanding of what does not need to be produced, possible only in production, which understands the being of what already lies at the ground of and precedes everything to be produced and thus is all the more already extant in itself.
>
> In the course of producing and using beings we come up against the actuality of what is already there before all producing, products, and producibles [that is, the ontically *a priori* or given], or of what offers resistance to the formative process that produces things. The concepts of matter and material have their origin in an understanding of being that is oriented to production. Otherwise, the idea of material as that *from which* something is produced would remain hidden. The concepts of matter and material, hyle, the counter-concepts to morphe, form, play a fundamental role in ancient philosophy not because the Greeks were materialists but because matter is a basic ontological concept that arises necessarily when a being - whether produced or is not in need of being produced - is interpreted in the horizon of the understanding of being which lies as such in productive comportment. (p.116)

There are (at least) three points to note in connection with the above statement: First, matter as the ontically *a priori* (that is, given) is held to be *essentially*-related to production (that is, *technē*); second, in stating that this relation holds insofar as production refers to ontical causation, the possibility of a non-causal production[35] arises in which matter can be redefined in non-material terms, for example, as itself artificed, viz. matter as ontically *a posteriori* (that is, made); third, that matter is *recalcitrant* and

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34 I am grateful to Mike Elstob for this point.

35 As stated in chapter 6, Plotinus defines idealistic *poiēsis* as a non-causal mode of production which stands in opposition to causal praxis.

"offers resistance to the formative process that produces things" points to a critical feature of those artifacts in which the substrate is material: To the extent that a substrate is not artificed (made) by an external `other' (and hence, is not *allopoiētic*), it must be *autopoiētic*. This is significant since, as shown in chapter 6, there is a connection between *physis* as *autopoiēsis* and *physis* as *poiēsis* (or Being *as such*) and it is the latter which is the originary or incipient source of existential modalities, that is, categories of Being (*Sein*) and, thereby, of the possibility of ontological emergence.

In Book II, ch.I of the *Physics*, Aristotle maintains that "the art of *using* .. involves knowledge of the form, whilst the art .. of *making* involves knowledge of the matter [emphasis added]." Given that artificing (productive *poiēsis*) stands in *essential* relation to knowledge of matter (*epistemē* of *hyle*), it might appear that form (*morphē*) is only *contingently*-related to artificing. However, this is not the case since, as shown in chapter 6, artificiality as *epistemē* denotes teleological *a priority*, that is, design, intentionality or epistemic *a priority* relative to the anthropic component (section 7.2.2), and, as Heidegger (1977a) has shown, design involves the imposition of form, viz. *technē* is a mode of revealing (*alētheuein*) which "gathers together in advance the *aspect* and the matter of the [artifact] with a view to the finished thing envisioned as completed, and from this gathering determines the manner of its construction [emphasis added]." (p.13) It might be argued that while this is certainly true for epistemically *a priori* or *designed* artifactuals, it does not hold for epistemically *a posteriori* or emergent artifactuals since the latter are teleonomic (or telic) as opposed to teleological and hence, merely *appear* to have been designed[36]. However, this position is problematic for the following reason: In the context of a discussion of emergence in computational systems, Risan (1996) maintains that "making a controllable [emergent] simulation is *geared towards* producing results[37] [emphasis added]." (p.72) Hence, emergent artifacts *are*, in some sense, teleologically *a prior*; that is, *design* is embedded at *some* ontological level in an artifact. In section 7.3.3, it will be argued that as a consequence of the ontology (Being) of computational *poiēsis*, which was identified in chapter 6 as (i) ontically-objective or externalistic, (ii) causally-efficient, and (iii) operationally-necessary or deterministic, ontology - *and hence, teleological a posteriority* - of *emergent* is circumscribed by teleological *a priority* - *and hence, ontology* - of *substrate*. However, it is crucial to appreciate that this relation is defined in the context of a *specific* substrate ontology, viz. computationalism (chapter 2). In order to determine whether this relation is *universal*, it is necessary to re-examine the ontology (Being) of computation and the relation between computers and "hard" (or pure) artificiality (section 7.3.2). However, before this is attempted, it is necessary to clarify the relation between form and matter in "hard" (or

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36 The intentionality of such artifactuals is *as-if* (Dennett,95).

37 Such results are intended to support hypotheses concerning possible relations - specifically, (behavioural, functional etc) isomorphisms - between the simulation and its referent, which, in the case of ALife, is natural life.

pure) and "soft" (or impure) artifacts.

In *Physics* B (Book I, chapter IV), Aristotle maintains that

> a couch (bedstead) and a robe and any other kind (of such things) that there is *insofar as* it is cited and grasped according to a given way of addressing it (e.g., as a robe) and inasmuch as it comes from a productive know-how, (such a thing) has *absolutely no* impulse to change arising from itself. However, *insofar as* it also pertains to such things (in a given instance) to be made of stone or of earth or of a mixture of the two, they *do have* in themselves an impulse to change, but they have it only to this extent.

From the above statement, it follows that the *artifactuality* of an artifact and hence, its grounding in the *other* (that is, the artificer) with respect to its possibilities for change (*poiēsis*) lies in the *form* of the artifact (product) which is *made* (artificial)[38]; in short, *as* artifactuals, the *poiēsis* associated with artifacts is *allopoiētic*. By contrast, the possibilities for self-change (*autopoiēsis*) in artifacts lies in the extent to which they supervene on *material* substrates which are *given* (natural) and hence, is grounded in the *naturality* of an artifact. Such artifacts, in which form is artifactual (made) and matter is natural (given) can be classified as "soft" (or impure) artifacts.

Given the *hybrid* natural-artificial (given-made) Being of "soft" (or impure) artifacts, it might appear that the *poiētic difference* (chapter 6) between naturality and artificiality (as artifactuality) cannot be upheld. For example, according to Miller (1995),

> life-forms that result from artificial selection by human breeders or genetic engineering .. blur the distinction between realization and simulation. If one makes a strong division between Nature and Culture [that is, Artifact], such life-forms are experimental simulations of what *would* happen if a lineage were subjected to some selective pressure or mutation in Nature; from a more integrated perspective, such life-forms are simply the outcome of a thoroughly Natural process that happens to include humans as selective forces. Likewise, experimental biology research that records animal behaviour in unnatural laboratory conditions could be viewed either as `realizations of behaviour *in extremis*', or `simulations of natural behaviour'. (pp.21-22)

Consistent with this position, Ferré (1988) maintains that those who interpret artifactuality as naturality (such as Dennett) hold that "since technology is firmly rooted in the laws of nature, using the raw materials of nature, and since it springs out of human nature [which is itself natural], it must be wholly natural." (p.19) However, he cautions against this line of inference:

> Taken too far, this line of reasoning would lose the concept of the artificial and would in the process obscure the striking differences between nature when left alone and nature when manipulated by intelligence for human ends. Perhaps human intelligence is `natural' in one sense; but in another it has brought about much that would never be found in nature without its intervention. There are now

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38 As will be shown in section 7.3.3, the form of computational "hard" (or pure) artifacts is processually-deterministic.

> literally new elements and materials that exist in the world only because of the intervention of physical and chemical technologies. There are not only new species of domesticated plants and animals but also wholly new lifeforms, thanks to biological technologies. The word `artificial' as antonym to`natural' may be too clumsy. A new variety of `black' tulip carefully developed for utmost darkness of hue, is the product of artifice (skill, intelligence, etc) but is not `artificial' in the way that a silk tulip is artificial. Still, though living, the black tulip is not completely `natural' either. (pp.19-20)

This position is supported in a Heideggerian context by Parkes (1987b) who maintains that

> the question is at what point the use of a natural thing as *Zeug* [that is, equipment] in such a way as to realize its possibilities with respect to human concerns begins to impinge overly on the unfolding of its possibilities when left to itself. Clearly the deforestation of an area of beautiful trees in order ro mass-produce ugly furniture is something even the most social-utility-minded Heideggerian would not condone. At the other extreme there is no doubt that Heidegger would applaud a woodworker who himself seeks and finds the perfect tree for the chair he has in mind, and then proceeds to fashion it with thoughtful hands that respond to the uniqueness of the wood, so that its hidden beauty may shine forth to the fullest. One is tempted to say not just that the woodworker has helped the tree to become more fully itself, but has actually helped it to become *more* than itself. (p.130)

From the above statements, it appears that although there *is* a distinction between naturals and artifactuals, this distinction is *essentially* `fuzzy'; in short, no clear distinction can be made between artificiality and naturality, thereby undermining claims for a postulated *poiētic difference* entailing an *ontical difference* (that is, a difference in the Being of beings) between such phenomena (chapter 6). However, that this is not *necessarily* the case, viz. the distinction between naturals and artifactuals is not fuzzy *by definition* (or *universally*), is readily shown by considering the possibility of artifacts in which the substrate (matter) is resolvable (or reducible) into a product (form) that is made (artificed)[39]: In such "hard" (or pure) artifacts *both* product *and* substratum are artifactual. Hence, there appears to be a distinction between "soft" (or impure) and "hard" (or pure) artifacts: In the former, only the form is made, the matter is given; in the latter, both form and matter are made. It might be argued that "hard"[40] artifacts do not exist, that everything artifactual (made) must *ultimately* supervene on something natural (given), in which case "soft" (or impure) artifactuality delimits artifactuality *as such*. This position derives support in a computationalist context from Eldred (1996), viz.

> human beings see the outline of beings; they can recall them and they can also *project them into the future*. This is the temporality of human being as Da-sein, there-being. In particular, the faculty of humans to fore-see beings in their being-limits, their `ontological delineation', is the basis of *technē*,

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39 It is crucial to appreciate that form does not entail artifactuality: The forms associated with naturals are *given* not made.

40 It is worthwhile briefly contrasting the "strong" *vs.* "weak" artificiality distinction with the "hard" (or pure) artificiality *vs.* "soft" (or impure) artificiality distinction: On the former, ontology is *statically*-grounded in epistemology (Kantian idealism); on the latter, ontology is *dynamically*-grounded in technology (Heideggerian realism).

> technics, technology. So, it is not just the case that human beings are susceptible *receivers* for the outline of beings as such, but they are also *transmitters of outlines of beings into the future in technological (forward-throwing) pro-jects*.
>
> Human beings are differentiated, that is, they are open and susceptible to the difference of the limiting outline which brings beings as such to stand in presencing. This can be seen most plainly today with the advent of the information technologies, which do nothing other than in-form media, i.e. inscribe a form, a de-limiting outline, in matter. Humans can discern [epistemically *a posteriori*] the difference thus in-formed [as a consequence of the ontically *a posteriori* and epistemically *a priori* being of artifactuals] and so become and are [epistemically] in-formed beings. In-formation is the ultimate mode of pro-duction of beings, because beings are *reduced* thereby to the naked skeleton [that is, `whatness'] of in-scribed matter reminiscent of Aristotle's conception of the work (*ergon*), especially the artwork, as matter (*hyle*) given a form (*morphe*) [emphasis added]. (p12)

On this basis, Eldred concludes that "to say that being is computation (computari est esse) means that everything that is is translatable into a digital form. Being in-formed and im-pressed [in the sense of gathered] by binary code is the ultimate metaphysical destiny of Western humankind." (p.13)[41] According to Feenberg (1997), "technical action autonomizes the subject through dissipating or deferring feedback from the object of action to the actor." However, "the technical subject does not modify the basic `law' of its objects, but rather uses that law to advantage." (p.12) This position is supported by Rocha (1998), viz. "at their core, [artificial systems] are rule-based, although they have to interact with whatever the laws are of the environments in which they are embedded." (p.5) Ferré (1988) maintains that "the totally naked human body, interacting face-to-face with the environment, unmediated by any artifact, contrivance, invention, or tool, would seem to stand as a paradigm case of the *non*-technological." (p.23) On this basis, he goes on to list four characteristics as definitive of technology, viz.

1. Technology is implemented, not `empty handed'
2. Technology is practical, not `for its own sake'
3. Technology is embodied, not `in the head' alone
4. Technology is intelligent, not `blind' (pp.23-25)

(3) is significant in the context of the present discussion since it appears to undermine the possibility of "hard" (or pure) artifacts in which matter (`embodiment') is ultimately reduced to form (`in the head'). However, Ferré undermines his own position in asserting that "matter may or may not be *essential* to technology; intelligence clearly is [emphasis added]." (p.16) Furthermore, "depending on the degree to which intelligence has determined the nature of the thing, we can meaningfully speak of something as more or less artificial." (p.28) On this view, a *pure* or "hard" artifact is one in which intelligence has completely determined the nature (Being) of the thing (being). In section 7.3.2, and consistent with Baudrillard's (1983) concept of the simulacrum as a non-referential

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41 It is important to appreciate that this im-pression (of form on matter) is a pro-duction and, crucially, one which brings about a *re*-duction of Being; in short, as stated in chapter 6, Being conceals itself under the technē-Enframing (*Gestellen*) associated with computationalism (chapter 2).

virtuality (chapter 6), it is maintained (1) that computation (and hence, computationalism) is an instance - in fact, the *defining* exemplar - of the class of "hard" (or pure) artifacts and (2) that the ontology of this class is intentionalistically-ideal (that is, Platonic or mental-ideational). The distinction between "soft" (or impure) and "hard" (or pure) artifacts can be described in terms of the triadic relation between productant, substratum and product (chapter 6) as shown in Fig 7.2:

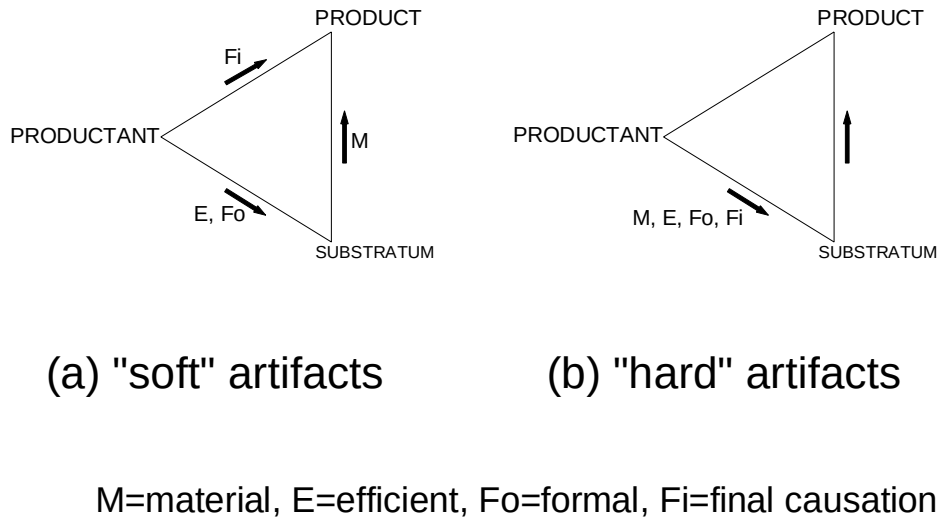

Figure 7.2 Triadic Relationality in "Hard" and "Soft" Artifactuality.

The distinction between "soft" (or impure) and "hard" (or pure) artifacts can also be defined in terms of the phenomenological framework of ontic (productive, organizational) and epistemic (interpretative, observational) relations to the anthropic component (artificer-interpreter) described in section 7.2:

		Form (*essentia*)	
		Given (ontically *a priori*) (epistemically *a posteriori*)	Made (ontically *a posteriori*) (epistemically *a priori*)
Matter (*Existentia*)	Given (ontically *a priori*) (epistemically *a posteriori*)	(1) Hard Naturals	(2) Soft Artifactuals
	Made (ontically *a posteriori*) (epistemically *a priori*)	(3) Soft Naturals	(4) Hard Artifactuals

Table 7.2 Phenomenological Classification of "Hard" and "Soft" Artifactuals.

7.3.2. Computers and "Hard" Artificiality

In chapter 2 the ontology of computation was defined in terms of formalism, mechanism, determinism and atomism and in chapter 6, the ontology of computational *poiēsis* (coming-forth, bringing-forth, becoming) was defined in terms of externality (ontical-objectivity, third-personhood), efficient causation and operational necessity (determinism). In this section, the ontology of computers is examined in relation to the definition of "hard" (or pure) artifactuality in section 7.3.1.

According to Bijl (1995), "we do not know just what it is we are (despite efforts by philosophers), nor exactly how computers are different, which is why we ought to be cautious about the kind of role we give to them." (p.189) This is because

> no technologist can tell us, *objectively and definitely*, what a computer is. Only through the collective efforts of all players can we expect to develop a notion of what computers can be, and in time computers will become something other than what they presently seem to be [emphasis added]. (p.204)

Bijl attempts to justify this position by appealing to Heideggerian pluralistic realism, viz. ontological equipmental Being (*Sein*) as *irreducible* to ontical causal Being (chapter 6). Crucially, on his view

> we do not know the *reality* of things we see as machines, as *things-in-themselves*, but know them as expressions from knowledge in ourselves, like literature and music and paintings [emphasis added]. (p.210)

This position is problematic since computers are *ontologically-ontical*, that is, their Being (*Sein*) is characterized by their *serviceability* (usability, utility, functionality) which is, in turn, dependent on their *reliability*, itself determined by the *determinism* or logical necessity of their operation (chapter 6). In short, beyond their ontological *use*-properties - which is a way of Being in-itself (*an sich*) that happens to be *interpreter*-relative - and their ontical *cause*-properties - which is a way of Being in-itself (*an sich*) that happens to be *producer*-relative - *there are no other properties of "hard" (or pure) artifacts*. Thus, Bijl's position is ultimately untenable, a consequence of failing to appreciate the unitary relation between Being and becoming and hence, the significance of the *poiētic difference* (chapter 6) in distinguishing humans from computers. In support of this latter position, Kelly (1993) maintains that

> the identification of computer and person through the enumeration of a list of properties faces a fatal objection right at the very beginning. A computer is a constructed artefact; a human being is a natural kind. Coy though we may occasionally be about our creative role, we must face the fact that we determine and assemble the characteristics of a computer. The unity it possesses is a unity *intended*

> by us. If it has properties reminiscent of ours, they are derived properties. Its being is *derived*. By contrast, our being is *found*; it is basic (with a due allowance for a Sartrean making of ourselves). We *are* in our *unity*, not as assembled lists or structures. [Yet] is [the ontological] identity of design, of structure, of use, of intention [in computers] not in itself an authentic identity ? Of course ! And is it not the same with man ? Do we not *come to identity* through structure, through behaviour, through use ? No ! The situations are reversed. Man's identity *is* first. Our discovery, our interpretation, our knowledge of design and structure is derived and secondary. But we do not *discover* a computer. We *make* it. Its design is first; its identity is derived and secondary. (p.145)

In terms of the phenomenological framework and artifact classification scheme described in sections 7.2 and 7.3.1 respectively, it follows that computers are "hard" (pure) artifactuals whereas persons (that is, human beings) are "hard" (pure) naturals.

In section 7.3.1, it was maintained that "hard" (or pure) artifactuals are ideational and that computation constitutes the defining exemplar of this class of phenomena. This position is supported by Searle (1992), Tallis (1994) and Lanier (1995b) who maintain (1) that computation is an *extrinsic* or observationally-relativistic (chapter 3) feature of the world and (2) that the observer must be conscious since extrinsicality implies intentionality and consciousness, on their view, is a *necessary* condition for intentionality. According to Searle (1992), "*the aim of natural science is to discover and characterize features that are intrinsic to the natural world. By its own definitions of computation and cognition, there is no way that computational cognitive science could ever be a natural science, because computation is not an intrinsic feature of the world. It is assigned relative to observers.*" (p.212) This position is supported by Miller (1995), viz. "the phenomena studied by natural science *predate* the science itself, whereas the phenomenon studied by computer science (e.g. `computation') depend on the science for their very existence. Computer science is more similar in nature and spirit to architecture and aeronautical engineering than it is to physics or biology." (pp.4-5) On Searle's view, "the characterization of a process as computational is a characterization of a physical system from outside; and the identification of the process as computational does not identify an intrinsic feature of the physics; it is essentially an observer-relative characterization." (pp.210-211) In short, "there is no way you could discover that something is intrinsically a digital computer because the characterization of it as a digital computer is always relative to an observer who assigns a syntactical interpretation to the purely physical features in the system." (p.210) Thus, "*notions such as computation, algorithm, and program do not name intrinsic physical features of systems.* Computational states are not *discovered within* the physics, they are *assigned to* the physics." (p.210) On his view, "for any object there is some description of that object such that under that description the object is a digital computer" (p.208) which is problematic since if "everything is a digital computer" then the computationalist assertion that the brain is a digital computer becomes trivially correct (and thereby meaningless). Searle maintains that "a more realistic definition of computation will emphasize such features as the causal relation among program states, programmability and controllability of the mechanism, and situatedness in the real world." (p.209) However,

> the 0's and 1's [of a computation] as such have no causal powers because they do not even exist except in the eyes of the beholder. *The implemented program has no causal powers other than those of the implementing medium* because the program has no real existence, no ontology, beyond that of the implementing medium. Physically speaking, there is no such thing as a separate `program level [emphasis added].' (p.215)

There are (at least) four points to note in connection with this position: First, Searle fails to adequately clarify the distinction between (i) the *assignment* of a computational status to a *given* phenomenon[42], viz. (epistemically) *a posteriori* interpretation of a phenomenon *as* a computation and (ii) computation *as* an artifact, that is, as a *made* or (epistemically) *a priori* designed (circumscribed, closed) phenomenon; in the former, observation-interpretation is *sufficient* for computation while in the latter organization-production is *necessary*. Although in "soft" (or impure) artifacts - that is, artifacts in which the substrate (matter) is given rather than made (and hence, physical as opposed to ideational) - computation *supervenes* (chapter 3) on physics, it does so in such a way as to *constrain* the possibility for expression of the latter. This is a necessary condition for *correct* (that is, functional) computational operation in physical systems[43]. In this sense, construction of *physical* computers involves the *circumsciption* (or closure) of *possibility* into *potentiality-actuality* (chapter 6).

Second, to the extent that computation *as* computation can be defined in abstract, formal and purely artifactual terms, ultimately there is no matter (givenness) to consider[44]. According to Searle (1992), "the multiple realizability [of computers] is a consequence not of the fact that the same *physical* effect can be achieved in different physical substances, but that the relevant properties are *purely syntactical*. The physics is *irrelevant* except insofar as it admits of the assignment of 0's and 1's and of state transitions between them [emphasis added]." (p.207) As stated previously, on his view "syntax is not intrinsic to physics. The *ascription* of syntactical properties is always relative to an agent or observer who *treats* certain *physical* phenomena as syntactical [emphasis added]." (p.208) However, although computation as a "hard" (or pure) artifact is syntactical and syntax is not intrinsic to physics, this is because either (i) physics is itself syntactical (computational), in which case form supervenes on matter which is itself formal, this formal-matter in turn supervening (as matter) on form in a potentially

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42 Irrespective of whether this given is `true' (natural) or `false' (artifactual).

43 Computation is ontologically-deterministic which implies necessity which, in turn, implies elimination of contingency and hence, preservation of constraint.

44 On this view, the *physical* constraints associated with the implementation of computation (chapter 5) are held to be either irrelevant or *reducible* to *formal* constraints.

infinite formal hierarchy[45] (Fig 7.3) or (ii) syntax is ideational (mental). In "hard" (or pure) artifactuality, knowing (epistemology) and Being (ontology) coincide. This position is supported by Bunge (1959) who maintains that "ideal objects, which lack self-movement [are not] altogether, self-sufficient, since for their very existence they depend on some mind." (p.196)

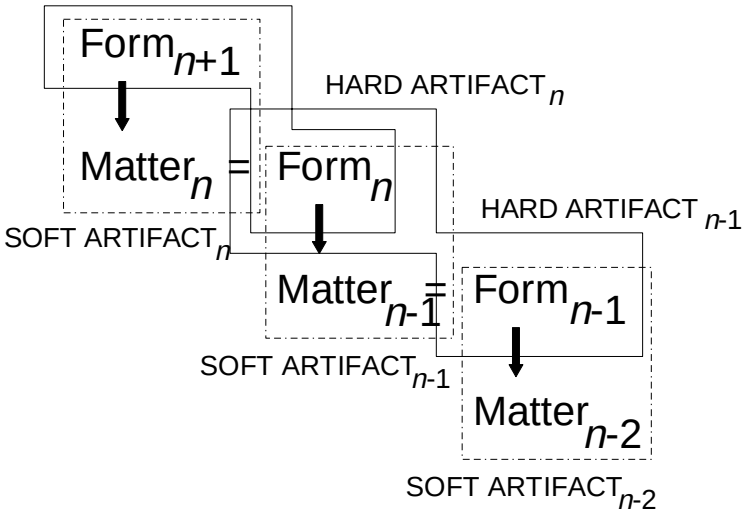

Fig 7.3 Matter-Form Hierarchy in "Soft" and "Hard" Artifacts.

Third, assuming a continuum physics, the emergence of discrete structures capable of symbolic interaction[46] appears to occasion new forms of causality (Cariani,89). It appears, therefore, that a program-implementing *medium* has new (or at least *different*) causal powers to a non-implementing medium and, crucially, as a *consequence* (that is,

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45 However, as Hilton (1991) points out, "there has to be an agent of transformation to turn any mere representation into an active and independent creation. That agent is the imagination." (p.60) A variant of this position, viz. panexperientialism (chapter 1), was proposed as a solution to the problem of how to `cut' (that is, actualize) phenomenal levels in a bidirectionally-infinite potentiality hierarchy (Ali,98a). However, rather than postulating some variant of *idealism*, it might be argued that matter can assume - and traditionally has assumed - this role. Yet this position is problematic given the dissolution to void suffered when physical entities are analysed in order to determine what constitutes their `similarity in difference' (chapter 2). Given the stasis of formal systems (chapter 2), it follows that the counterconcept to form is not matter but movement (*kinesis*). This latter point is extremely important since (i) according to Heidegger, the *archē* (incipient origin) of *kinesis* (movement) is not in the artif*act* but in the artif*icer* (section 7.3.3) and (ii) the dissolution of matter to void and the requirement for dynamism (movement) can be satisfied by the postulation of a dynamic interpretation of nothing (chapter 6).

46 Pattee (1989) identifies the emergence associated with discrete, rate-independent, symbolic interaction as semantic emergence (chapter 3).

effect) of the existence of the supervening program. On this basis, it follows that the implemented program must, contrary to Searle's assertion, have (additional) causal powers. However, this position is problematic since causation is defined relative to a set of observables, viz. emergence-relative-to-a-model (chapter 3), such that a change in the set of observables entails a change in causal relationality. On this view, both causality and *changes* in causality are epistemological. This is significant because it means that the causality of computational systems might, in fact, be *ontologically-reducible* (chapter 3) to the causality of the non-implementing medium *under constraint* (that is, circumscription) as Searle maintains.

Fourth, Searle fails to consider the computationalist possibility that physics is itself *intrinsically computational*[47]. This possibility appears to be excluded given his assertion that computation is ontologically *extrinsic*, that is, observationally-relativistic. However, Searle appears to undermine this position in maintaining that in a *human* computer, "there really is a program level *intrinsic* to the system, and it is functioning causally at that level to convert input to output. This is because the human is consciously following the rules for doing a certain computation, and this causally explains his performance. But when we program the mechanical computer to perform the same computation, the assignment of a computational interpretation is now relative to us, the outside homunculi. *There is no intentional causation intrinsic to the system* [emphasis added]." (p.216) The problem with this position is that, on his view, intentional states are macroscopic features associated with certain microscopic neurophysiological processes; hence, causation is bottom-up from brain to mind. The implication, Searle's arguments to the contrary notwithstanding, is that intentionality is either non-causal or (what amounts to the same thing) causally-epiphenomenal[48]. However, if the intentional aspect associated with computation is not defined in causal - that is, *ontical* - terms then it must be defined in observational - that is, *epistemic* - terms.

7.3.3. "Hard" Emergent Artifacts and The *Poiētic Difference*

The aim of this section is to establish that there is no difference between designed and emergent "hard" (or pure) artifacts with respect to their distinction from naturals; in short, that the *poiētic difference* (chapter 6) between naturals and "hard" artificials (as artifactuals) applies in both instances. In this connection, it is important to appreciate at the outset that computation, which constitutes the defining exemplar of "hard" (or pure) artificiality, is wholly *abstract* in the sense that it is completely encapsulated (defined)

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47 On this view, while all phenomena are computational, they are not necessarily instances of the same program (Turing machine): On the unified framework of computationally emergent artificiality described in chapter 5, phenomena are hierarchically-embedded as virtual machines.

48 It is crucial to appreciate that this argument undermines the *causality* associated with Searlian intentionality and not the ontological reality of intentionality as such.

in terms of logically necessary (that is, deterministically-circumscribed epistemically *a priori*) movements between forms[49]. For those beings (*Seiendes*) whose Being (*Sein*) is determined by *form* (or essence), *what* they are is *determined* by their form. In the case of artifacts, this form is *given* by the artificer (and hence, *made*). For "hard" (or pure) artifacts, there is *nothing but form* (sections 7.3.1 and 7.3.2); that is, matter (the given) itself resolves into form (the made): In terms of the triadic relation described in chapter 6, both substratum and product are formally-defined. Furthermore, *because* the substratum (or matter) of the artifact is formally-defined, its Being is circumscribed epistemically *a priori*, and *because* in formal systems (chapter 2) theorems (products) *follow* from - that is, are determined (or delimited in their Being) by - axioms (substrata), product ontology follows substratum ontology.

According to Elstob (1988),

> the notion of a specification implies something that is bounded and determined and which always remains within what is *implied and allowed* by the specification. If a thing is specified then, by definition, it cannot transcend its specification without being something other than what was specified [emphasis added]. (p.94)

That which is `implied and allowed' constitutes the *potentiality* of the thing and, by definition, is circumscribed *a priori*. Such things are, therefore, epistemically *a priori* with respect to potentiality (design) and epistemically *a posteriori* with respect to actuality (emergence). However, as *specified*, such things are ontically *a posteriori* relative to the artificer. Elstob goes on to assert that

> since a machine cannot transcend its specification and still be *regarded* as a machine in the *precise* sense, it is clear that such a notion is unsuitable for modelling transcendent processes [emphasis added]. (p.95)

According to the above statement, the designation of something as a machine is (tacitly) an *epistemic* issue, viz. how something is regarded (viewed, interpreted). According to the position adopted in this study, the concept of a *transcendent machine*, that is, something which transcends its *specification*, is an ontological impossibility[50] since *to-be-a-machine is to be specified, determined* (that is, essence and existence of machinehood consists in determinism which entails closure to self-transcendence). Only naturals, which are ontically *a priori* (given), can be transcendent and yet interpreted (epistemically *a posteriori*) *as-if* machines. According to Levin (1979),

> that somebody intended [machine] *B'* to act the way it does has nothing to do with *what B'* does or how to describe it. If *B'* had come into existence by blind natural processes, we could not say that *B'*

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49 In a formal system, movement is between forms; in a *computational realization* of a formal system (such as a CA), this movement is *deterministic* (functionally-surjective, injective or bijective).

50 An instance of the Fallacy of Misplaced Concreteness (Whitehead,26).

> is uncreative because it was acting in ways it *could have been* instructed in. (p.215)

It is crucial to appreciate that Levin assumes a discontinuity between Being and becoming (chapter 1) which is readily contested following Heidegger (and the processualists). As shown in chapter 6, a distinction in becoming *entails* a distinction in Being because of the essential unitary relatedness of Being and becoming. The *poiētic difference* between naturals and artificials (as artifactuals) has implications for the ontical difference between "soft" (or impure) and "hard" (or pure) artifacts because the former are natural at the level of the substratum (hence, the *impurity*) whereas the latter are artifactual at all levels (that is, substratum and product). Thus, while the above argument applies in the context of "soft" (or impure) artifacts - which are, in principle, capable of *autopoiēsis* and hence, of *overriding* embedded intentionality - it does not hold for "hard" (or pure) artifacts in which the intentionality of the artificer (which is *contingent*) is embedded in the artifactual substrate *thereby defining the causal (or functional) essence (what-ness)* of the artifactual being (which is *necessary*). In short, "hard" (or pure) artifactuals are ontically *a posteriori* (made) and specified (epistemically *a priori*) and hence, closed to transcendence[51].

Rieu (1995) maintains that "artifacts are no longer objects; they require being known *from the inside*, by distinguishing their structure and its virtualities, the medium expressing it and, most of all, the functions they satisfy. *Objects have become artifacts* [emphasis added]." Crucially, on his view, "the [human] subject is within the artifact at the connection between the function and the structure." (p.10) In a "hard" (or pure) artifact, the medium (matter) is itself structural (formal) and reflects an embedded functionality (artificer-intentionality). Given (i) the link between embedded intentionality and teleological *a priority* (chapter 6 and section 7.2), (ii) the link between teleology and form, and (iii) the determinism of formal-computational systems, it follows that "hard" artifacts, whose substrates are circumscribed epistemically *a priori* - and hence, are ontically *a posteriori* - have products that are epistemically *a posteriori* and yet teleologically *a priori* in the sense of closed, circumscribed. This position is supported by Heidegger (1939), viz.

> the *telos* the antecedently envisioned appearance [of the artifact] is what is known by the person with the know-how, and it exists in *that person*. Only in this way is it the origin of the idea of the thing and the ordering of its manufacture. The *eidos* [or form] in itself is not the *archē* of the artifact. Rather, the *eidos proaireton* i.e., the *proairesis* [that is, the *propositional* or *proposed* which means *imposed*], i.e., the *technē*, is the *archē* of the artifact. (p.193)

On this basis, he concludes that "in the case of artifacts, therefore, the *archē* [or origin] of their movedness - and thus of the rest that characterizes their being-completed [that is, *closure*] and being-made [that is, artificiality as *artifactuality*] - is not in the artifacts

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51 Necessary and sufficient conditions for transcendence and non-transcendence (mechanism) are epistemic *a posteriority*, ontic *a priority* and epistemic *a priority*, ontic *a posteriority* of substrate respectively.

themselves but in something else, in the *architecton* the one who controls the *technē* as *archē*." (p.193) In linking *telos* (end) with *archē* (origin), it is maintained that it is possible to ignore the intermediate - and epistemically *a posteriori* - stages in the unconcealment of the Being of an artifact *from an ontological perspective*: In short, what is significant is the incipience (origin) and the presencing (end) of the artifact and these are ontologically-circumscribed epistemically *a priori* by the artificer, the ontological *becoming* of the artifactual being bounded (contained) by these limits. The implication is that Aristotle's conception of *technē* - as interpreted following Heidegger (chapter 6) - is broad enough to cover both conventional (designed) artifacts and emergent artifactuality.

According to Elstob (1991), it is possible that "entities that have the capacity for creational change" might be constructed (that is, artificed) or "perhaps more appropriately", have their growth initiated by human artificers. Furthermore, he maintains that it is quite possible that "guidelines" and "understanding" of "the conditions likely to initiate and support creational change" (p.165) can be established. This position derives support from Eames (1977) assertion that

> there is [a] kind of reductionism which the pragmatic naturalists reject. One explanatory technique frequently adopted is that of analyzing complex forms and functions by reducing them to their historical origins. The explanation of emergent and transformed qualities and functions in terms of their origins is called the *genetic fallacy* .. This explanation of [a natural phenomenon's] emergent qualities and their interactions ignores the transformations the [phenomenon] has undergone in its developmental history. (p.21)

While Eames' statement appears to undermine the significance of *incipience* (*archē* or origination) with respect to the question concerning emergence, in fact, this is not the case. As shown in chapter 6, for Heidegger (1993b), the Being (*Sein*) of a being is *historical*, viz. "what is past is always a no-longer-being, but what has been is being that still presences but is concealed in its incipience" (p.73), and this position is supported by the pragmatic naturalists[52]. However, while the importance of (ontical) *developmental transformations* cannot be denied, according to Heidegger (1959, 1993b), *incipience* (origination) is critical in demarcating potentiality since it coincides with the originary

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52 According to Mead (1932), "the organization of any individual thing carries with it the relation of this thing to processes that occurred before this organization set in. In this sense the past of that thing is `given' in the passing present of the thing, and our histories of things are elaborations of what is implicit in this situation." (p.18) However, as Lemmen (1997) states, "science can only capture the body insofar as it is already constituted, it can only capture the cognizer as *naturata*, but not as *naturans*. Since the living body is *its own* (sedimentary) product, a formalization of it necessarily leaves out something crucial. This is closely related to the fact that formalizations are necessarily *post hoc* and also to the fact that cognitive science has tremendous problems accounting for creativity." (p.2) In Heideggerian terms, science can only access Being as *ousia*, that is, as the stable, enduring appearance that is the end point (*telos*) of the dynamic appearing (presencing) that is *physis*. However, while this is true of *physis* (ontically *a priori* relative to the anthropic component) this does not hold for *technē* (ontically *a posteriori* relative to the anthropic component).

givenness of Being (*Sein*) to beings (*Seiendes*); *ontological* consideration of origins is important because ontological (existential) incipience is *prior* to the ontical (causal) relationality of beings to beings and thus, to developmental transformation as manifested in causal becoming (from being to being)[53]. If Heidegger is correct and the *poiēsis* (coming-forth, bringing-forth) associated with Being is multiply-moded then historical difference in coming-to-be - which includes difference in incipience or origin - *means* difference in Being thereby providing support for a critique of the possibility of emergence in "hard" (or pure) artificial systems. In this connection, it is crucial to appreciate that the pragmatist criticisms of the genetic fallacy are formulated in a *naturalistic* context; hence, while these arguments *may* apply to "soft" (or impure) artifacts[54], they do not apply to "hard" (or pure) artifacts since the latter are, *by definition*, ontically-closed (circumscribed) and operationally-mechanistic (that is, deterministic) relative to their Enframing (specification) by the artificer[55].

In the context of a discussion of computational artificial life (or A-Life) (chapter 4), Bedau (1998) differentiates between top-down serial specified systems as associated with "Good Old-Fashioned AI" and bottom-up parallel specified systems associated with A-Life and connectionism. From the perspective of this study, what is interesting is that apart from systemicity, both approaches (top-down and bottom-up) involve *specification* (closure and determinism) at some level. The type of emergence in computationally emergent systems (chapter 3) is `weak', which Bedau defines as follows:

> A system's macrostate is weakly emergent .. just in case it can be *derived* from the system's external conditions (including its initial conditions) and its micro-level dynamical process but *only through the process of simulation* [emphasis added]. (p.140)

Crucially, weak emergence entails holding that emergents (that is, emergent phenomena) are completely determined by causal processes operating at the substrate level. The ontology of the substrate is specified (that is, determined) by the artificer who opens-up, via `cutting', a potentiality-actuality state-space which is traversed by a logically necessary (that is, deterministic) state-transition function. Since that which is

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53 *Ontological emergence* necessitates a movement *from* beings *to* Being (nothing) followed by a movement *from* Being (nothing) *to* beings since movements between beings are categorially-closed (chapter 6).

54 "Soft" artifacts are impure to the extent that they contain components which are natural (given) as opposed to artifactual (made). Artificiality (as artifactuality) can be defined in terms of *technē*-Enframing (*Gestellen*) - which is characterized by *closure* from *without (other)* (*allopoiēsis*) - and contrasted with naturality as *physis* - which, by association with Being *as such* (*Seyn*) as the in-finite (*apeiron*) (chapter 6), is characterized by *openness* from *within (self)* (*autopoiēsis*). In short, `soft' artifacts have the possibility for emergence because of their partially-natural character *and not because of their partially-artifactual character*.

55 According to Silberstein (1998), "matter conceived *à la* classical physics cannot possibly yield a naturalistic [and emergentist] explanation of consciousness." (p.477) However, it is crucial to appreciate that indeterminism (or non-determinism), while necessary, is not sufficient for ontological emergence.

epistemically *a posteriori* (emergent macrostate) is derivable (via simulation) from that which is epistemically *a priori* (substrate microstate) then, with respect to *poiētic* relationality, designed and emergent computational artificialities are identical. This is important because Being and becoming (*poiēsis*) stand in essential, unitary relation (chapter 6) which means that designed and "hard" emergent artificialities are *ontologically* identical. Bedau provides implicit support for this position in drawing attention to the problems associated with attempts at simulating the evolutionary process in order to establish whether it is directional or otherwise. As he states,

> we can finally discern the global pattern (if any) inherent in the process of open-ended evolution only by creating and empirically observing the relevant emergent thought experiments. [Unfortunately,] it is not obvious how to do the experiment[s] because it is unclear how to *design* a system that exhibits the kind of *open-ended* evolution characteristic of our biosphere [emphasis added]. (p.147)

According to the position argued herein, this is logically impossible since "hard" (or pure) artifactual *design* entails closure[56]. As Turing (1948) states,

> one may also sometimes speak of a machine modifying itself, or of a machine changing its own instructions. *This is really a nonsensical form of phraseology, but is convenient.* Of course, according to our conventions the `machine' is completely described by the relation between its possible configurations at consecutive moments. It is an abstraction which by the form of its definition cannot change in time. (p.9)

7.3.4. Computational and Ontological Emergence

In this section, the concept of computational emergence (chapter 3) is briefly re-examined in preparation for determining whether or not CA-computationalism (chapter 5) can support ontological emergence and thereby solve the category problem (section 7.4), viz. the problem of how ontological subjectivity can emerge from an ontologically-objective substrate.

Risan (1996) maintains that

> evolution [within ALife simulations] produces so-called *emergent properties*, properties that could not have been predicted beforehand. If there had been no emergent properties in the system, then the researcher would not have been able to read more out of the system than he himself had programmed into it. His or her science would thus have been tautological. (p.86)

This position is problematic for (at least) three reasons: First, as will be seen in what follows, it is unclear whether there *are* emergent properties *in the system*; second, and relatedly, it is unclear whether such properties are ontic or epistemic; third, and relatedly, it is unclear whether or not artificial science *is* tautologous. According to Toffoli and Margolus (1987),

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56 The openness in "hard" (or pure) artifactuals is bounded (and hence, relative), viz. potentiality.

> it is often too easy to arrive at models that display the expected phenomenology just because the outward symptoms themselves, rather than some deeper internal reasons, have been directly programmed in .. We want models that talk back to us, models that have a mind of their own. *We want to get out of our models more than we have put in* [emphasis added]. (p.142)

In chapter 3, while it was maintained that causality in computational systems such as CAs is bottom-up *from* the local (or microstate) level *to* the global (or macrostate) level, it was also maintained that CAs support a form of `downwards causation', viz. *global constraint* (that is, contextual-bounding of FSM state-transition rule activation). However, this position is incorrect since the global context is, in fact, *epiphenomenal* (that is, non-causal): Given a CA specification[57] (local FSM state-transition rule, initial CA state), global state *unfolds* preformationalistically (deterministically), that is, becomes explicit (actual or explicate) having been implicit (potential or implicate). As a consequence of the functional closure of (1) the components (FSMs) and (2) the component interconnection topology (local neighbourhood), local (microstate) behaviour is *sufficient* to determine the evolution of *both* local (microstate) *and* global (macrostate) behaviour; hence, with respect to *causality*, the global level of the system is simply irrelevant and hence, epiphenomenal (or non-causal). This position is supported by Cariani (1991) who maintains that "as observer-programmers [that is, artificer-interpreters] we can always find a frame which will make our simulation appear nonemergent." (p.789) As he goes on to state,

> for the purposes of judging whether an emergent event has occurred, we need to be careful not to shift frames of reference .. from talking in terms of microstates .. before and `higher level' features afterwards. If we start to observe [a phenomenon] in terms of individual [microstates], we must continue to do so in these terms throughout. (p.790)

In short, and consistent with his concept of emergence-relative-to-a-model (chapter 3), Cariani maintains that a necessary condition for emergence is the *deviation* of a system's behaviour from a model describing that behaviour, thereby *necessitating* the construction of a new model incorporating the new behavioural features. In computational systems such as CAs, FSM functionality (behaviour) is deterministic (surjective, injective or bijective) and epistemically *a priori* circumscribed (that is, closed by design); hence, it is *impossible* for the FSM to *deviate* in its functionality (behaviour). Given this fact, model construction is unnecessary which implies that (epistemological) emergence does not occur[58].

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57 Functional connectivity (topology) and functionality of FSMs are assumed to be homogeneous.

58 Further support for the view that causality is bottom-up and that the global (macrostate) level is epiphenomenal is provided by Faith (1998) who, in the context of a discussion of the Game of Life (chapters 2, 4 and 5), maintains that "the rules governing the fate of a cell are written in lower level terms such as `a cell will not survive into the next generation if it has no neighbours'. In practice the fate of a particular cell will be instrumentally dependent on its context, but this dependence is derived from the more fundamental dependence expressed in formal atomistic terms [that is, at the level of the substrate]. In other words, the fate of a particular

In this connection, it is interesting to note in passing the position of Maturana (1997) who not only asserts that the *top-down* relation between the global (macrostate) level and the local (microstate) level is non-causal (epiphenomenal) but that *there are no causal relations between these levels at all*. In the context of a discussion of the autopoietic organization of biological systems (chapter 6), he maintains that

> living systems exist in two operational domains, namely: the domain of their composition that is where their autopoiesis exists and in fact operates as a closed network of molecular productions, and the domain or medium where they arise and exist as totalities in recursive interactions. The first domain is where the observer sees them in their anatomy and physiology, the second domain is where the observer distinguishes them as organism or living systems. *These two domains do not intersect, and cannot be deduced one from the other*, although the composition of the living system as an autopoietic system by constituting it as a bounded or singular totality, *makes possible the other* as the domain in which it operates as such totality or discrete entity. That is, as the two domains of existence of living systems (or of composite entities in general) do not intersect, *there is no causal relation*, or what an observer could call causal relations, between them; all that there is are *reciprocal generative relations* that the observer may see as he or she distinguishes dynamic correlations between the operations, phenomena or processes that take place in them [emphasis added]. (p.3)

However this position is incoherent since on the one hand, Maturana maintains that "there is no causal relation" between "the two domains of existence", while on the other hand asserting that the compositional (or microstate) domain "makes possible" via "reciprocal generative relations" the holistic (or macrostate) domain. Clearly, making-possible and generation are causal and genetic concepts. The validity of this scheme is further undermined by the fact that such domains are, on Maturana's view, epistemological (that is, observationally-relativistic)[59] which implies that the generative (causal) relation holds between *descriptions*. In this connection, Maturana's position is similar to that of Searle (1992) who maintains that consciousness is a causally-emergent *higher-level* biological property of neurophysiological processes: On both views, an attempt is made at applying causation - an *ontic* relation (chapter 6) - between *epistemic* constructs, viz. descriptions of the *same* phenomenon at different levels[60].

In concluding this section, it is worthwhile briefly restating the facts regarding the ontology of computation in relation to the question concerning emergence. According to Cariani (1989),

> the functionality of computation is the transition from an initial state to a final state by virtue of only

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cell will be dependent on its position within a glider or a blinker, but only because the future state of a cell is a function of the number of neighbours that it has, and gliders and blinkers are made from different arrangements of cells. The future of a cell is not affected by its position within a glider *qua* glider." (p.4)

59 According to Mingers (1995), Maturana is a radical constructivist (or ontological relativist).

60 As Tallis (1994) states, on this view, "an entity or *stuff* can causally interact with itself in virtue of being *seen* at two levels! [emphasis added]" (p.39)

> the type [or formal] property of the initial state .. This implies that the transitions of symbolic states to other symbolic states is unique, that one symbol state will give rise to one and only one final symbol state, because the initial state has one and only one type [or formal] designation and the transition depends only upon type [or formal] designation. (pp.79-80)

It is crucial to appreciate that the ontology of such symbolic types (or forms) is objective (that is, externalistic or third-person) since, as Cariani goes on to state, "compositions or couplings of computations *produce other computations* .. As long as each step is deterministic, i.e. as long as each input-output relation is a function, then the total input-output relation will be a function [emphasis added]." (p.81) In short, computation is *ontologically-transitive* (or categorially-closed) which means that computationalism is incapable of *ontological emergence*[61]. As Cariani states, "computer simulations of any sort .. will not *create* properties which were not encoded in the simulation from the very start [emphasis added]." (p.157) However, it is crucial to appreciate that the only *kind* of properties than *can* be encoded in computer simulations are those which are ontologically-computational, that is, externalistic (or behavioural), operationally-necessary (or deterministic) and efficiently-causal. On Cariani's view, the higher-level patterns which emerge during the course of a computer simulation "are patterns which must be recognized by the human observer. No new rules [or state-transition functionality] come into play which were not in some sense [that is, at some ontological level] prespecified. No behaviour arises which is not a logical consequence of the simulation rules and the initial state." (pp.157-158) There are (at least) two points to note in regard to the previous statement: First, emergence of higher-level patterns is relative to an observer (chapter 3); and second, it is *patterns*, that is, *ontologically-objective* (externalistic, third-person) macroscopic behaviours or structures (whether static or dynamic) that emerge through the *ontologically-objective* (externalistic, third-person) operation of state-transition rules defined in terms of *ontologically-objective* (externalistic, third-person) microstates (patterns). Thus, computational emergence is categorially-closed and hence, incapable of ontological emergence. According to Cariani,

> we can have emergent devices [which are "soft" artifacts] if we give up the deterministic, symbolic nature of the devices, and we can have well-behaved computer simulations [which are "hard" artifacts] as long as we give up the hope of making them emergent, but *we cannot have both at the same time*. (p.160)

Although his framework establishes the conditions under which *epistemological*

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61 According to Cariani (1989), "chaotic computational processes do raise the apparent complexity of the simulation's behaviour, in terms of the complexity of the algorithm needed to replicate it, but this really has nothing to do with emergence relative to a *designer* who has complete knowledge of the initial state and the state transition rules. *Even if the only effective means of predicting exactly what will happen is to run the simulation itself, that does not mean that new categories have been formed*. The behaviour of the system is still circumscribable, still expressible in the original notation of possible outcomes [emphasis added]." (pp.189-190) Thus, "the best one can do is to generate unexpected combinations of existing primitives, unanticipated behaviour within completely anticipated categories." (p.184)

emergence is held to occur, it is important to appreciate that it does not address the issue of ontological emergence, specifically, the emergence of ontological subjectivity from an (assumed) ontologically-objective substrate (section 7.4). In fact, the above framework *cannot* address this problem since it is defined in *essentially* (that is, necessarily) behaviouristic (ontologically-objective, externalistic) terms, viz. publically-accessible observables[62].

7.4. Computationalism and The Category Problem

In this section, the category problem, that is, the problem of explaining how ontological subjectivity can arise in an ontologically-objective substrate, is examined in connection with the assumption of metaphysical computationalism.

7.4.1. Ontological Subjectivity

The concept of ontological subjectivity (first-personhood, internality, experiential-awareness[63]) is closely linked to that of consciousness. According to Nagel (1979), "an organism has conscious mental states if and only if there is something that it is like to *be* that organism - something it is like *for* the organism." (p.166) Furthermore, and anticipating formal statement of the category problem, Nagel asserts that "one cannot derive a *pour soi* [or *for-itself*] from an *en soi* [or *in-itself*]." (p.188) Griffin (1998) clarifies this position as follows:

> an *en soi* has only an `outside', having no features beyond those that are perceivable in principle by others and describable in externalistic language; it is hence nothing but an *object* (for others). A *pour soi*, by contrast, has an `inside', having features that are not externally perceivable by others and describable in externalistic terms; it is thus a *subject* (for itself). A subject or a *pour soi*, in other words, is something about which we can intelligibly ask, `What is it like to be one of those ?' (p.64)

In this connection, it is interesting to note with Margolis (1989) that "the question of whether selves and persons may be eliminated by some ontological maneuver may be safely set aside: there is no known argument that actually effects that economy once we concede the reality of psychological experience (in however narrow or broad a sense we favour) or once we concede cognizing activities or actions informed by experience." (p.4) In short, the phenomenon of consciousness (experience, first-personhood) is

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62 This fact is implicit in Cariani's (1991) assertion that "if we wish to include complex [higher level] patterns, they need to be in our state descriptions from the start, *or they will remain in the realm of tacit, private observation, unrecognized by our public model* [emphasis added]." (p.790)

63 Chalmers (1996) presents the following non-exhaustive "catalog of conscious experiences", viz. visual experiences, auditory experiences, tactile experiences, olfactory experiences, taste experiences, experiences of hot and cold, pain, other bodily sensations, mental imagery, conceptual thought, emotions, and sense of self (pp.6-11).

ontological[64] as opposed to merely *epistemological*; hence, as Griffin (1998) - following Searle (1992, 1997) - points out, "with regard to the what-it's-like-ness of experience itself, there is no basis for a distinction between appearance and reality." (p.105) For this reason, consciousness (experience, first-personhood) belongs to a distinct ontological *category* which is referred to herein as *ontological subjectivity*.

7.4.2. The Category Problem

Griffin (1998) distinguishes the following variants of the mind-body problem (chapter 4), viz.

1. How could *experience* (whether conscious or not) arise out of, and perhaps act back on, nonexperiencing things (or events, or processes) ?

2. How could a *unified* experience arise out of, perhaps act back on, a brain ?

3. How could *conscious* experience arise out of, and perhaps act back on, a brain ?

4. How could *self-conscious* experience arise out of, and perhaps act back on, a brain ?

5. How could conscious animal experience have arisen in the evolutionary process out of nonconscious animal experience ?

6. How could self-conscious experience have arisen in the evolutionary process out of merely conscious animal experience ? (p.9)

In the context of the present study, what is significant is that experience, consciousness and self-consciousness belong to the same ontological category, viz. ontological subjectivity. It is important to appreciate that the question of downwards causation (chapter 3) is explicitly incorporated in four of the above descriptions of the mind-body problem. However, in contemporary discussions of the problem, it is largely (and tacitly) assumed that top-down causation (*from* mind *to* body) must be epiphenomenal (that is, non-causal) since, as Chalmers (1996) states, "the best evidence of contemporary science tells us that the physical world is more or less causally closed: for every physical event, there is a sufficient cause." (p.125) On this basis, Harnad (1998) maintains that consciousness *must* be caused by the brain because to assert otherwise - for example, to adopt a variant of causal dualism (interactionism) - would be to undermine "all of physics and its conservation laws." (p.3) Chalmers (1996) thereby *reduces* the mind-body problem into the "hard" problem, viz. "why is all this processing [in the brain] accompanied by an experienced inner life ?" (p.xii) and "[how] could [consciousness]

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64 In defending the classification of the mind-body problem (chapter 4 and section 7.4.2) *as* an *ontological* problem, De Quincey (1996) asks "how can that which [eliminativists claim] has no real existence [viz. epiphenomenal consciousness] construct the story in which its own existence is denied ?" since "it was precisely this subjective `fiction' which has somehow managed to construct that objective world picture in the first place." (p.15)

possibility arise from lumpy gray matter ?" (p.3) There are (at least) two problems with this position: First, it is crucial to appreciate that the brain (`lumpy gray matter') is a "hard" (or pure) natural (section 7.3.1), that is, ontically *a priori* (or *given*) and epistemically *a posteriori* (or *interpreted*); hence, it is unclear whether the brain *is*, as is implied in Chalmers' statement, a *nonexperiential* entity. As Griffin (1998) states,

> it is one thing to say that we know that it is possible for conscious states to arise out of a brain, because it actually occurs. It is something entirely different to say that we know that it is possible for conscious states to arise out of *a brain composed of neurons that are individually insentient*, because it has actually happened. This we do not know; it is pure supposition. (p.74)

Second, Harnad's position is a *non sequitur* since, as Marres (1989) has argued, physics and its conservation laws describe only the *external* (or behavioural) interactions of phenomena: This holds equally whether physics is conceived in Newtonian (particular) or post-Newtonian (energetic) terms since the ontological interpretation of the phenomena in question is objectivistic (that is, externalistic); in short, `matter' is held to be `vacuous' (Griffin,98). On Marres *interactionist* scheme,

> the chain of physical causes and effects does not need to have gaps. On this view when the mental acts on the physical, *the physical cause is not sufficient.* So the continuity and causal activity of the physical world are preserved, although that world is not regarded as a causally closed system [emphasis added]. (p.178)

Causation is a relation between beings (section 6.4.1.3). In order for the causal relation to be observable, the component *relata* (beings) must themselves be observable. In being observable, a thing (being) stands over against as an object (known, observ*ed*) in relation to a subject (knower, observ*er*) (section 7.2.1); consequently, the beings in an *observable* causal relation are conceptualized as *externalistic* (that is, ontologically-objective) and as externalistically-related. However, *other*-observability (that is, *observability-by-other*) does not constitute a *necessary* condition for causation; hence, the possibility of unobservable, *internalistic* (that is, ontologically-subjective) causation. On this view, the physical universe can be *both* externalistically-closed *and* internalistically-open, thereby undermining the logical necessity of Harnad's argument.

On the basis of the above arguments, it follows that the reduction of the mind-body problem (with its experiential *and* causal aspects) to the "hard" problem (defined purely in terms of the question concerning experience) constitutes an *eliminativist* move, the validity of which is highly questionable. For the purposes of this study, however, this maneuver will be taken to be valid subject to the following condition, viz. that a solution to the "hard" problem must be *emergentist* in nature. This restriction on the "hard" problem leads to what has been refered to throughout this study as the *category problem*, that is, the problem of explaining how ontological subjectivity (internality, first-personhood) can *emerge* from an ontologically-objective (externalistic, third-person) substrate.

According to Waterhouse (1981), "it is part of the corruption of the tradition that feelings and affects, instead of being treated as basic, have sunk to the level of `accompanying phenomena'." (p.86) Furthermore, "we can see now that this neglect was motivated by the common human desire to avoid the real questions of self." (p.138) However, it is important to appreciate that the category problem associated with ontological subjectivity is not identical to the problem of *qualia* (that is, *secondary* qualities (chapter 2) or private, inner mental objects). In this connection, consider the following argument due to Jackson (1982) which attempts to establish the falsity of physicalism with respect to the problem of qualia:

> Mary is a brilliant scientist who is, for whatever reason, forced to investigate the world from a black and white room *via* a black and white television monitor. She specializes in the neurophysiology of vision and acquires, let us suppose, all the physical information there is to obtain about what goes on when we see ripe tomatoes, or the sky, and use terms like `red', `blue', and so on. She discovers, for example, just which wavelength combinations from the sky stimulate the retina, and exactly how this produces *via* the central nervous system the contraction of the vocal cords and expulsion of air from the lungs that results in the uttering of the sentence `The sky is blue'. (It can hardly be denied that it is in principle possible to obtain all this physical information from black and white television, otherwise the Open University would *of necessity* need to use color television.) What will happen when Mary is released from her black and white room or is given a color television monitor ? Will she *learn* anything or not ? It seems just obvious that she will learn something about the world and our visual experience of it. But then it is inescapable that her previous knowledge was incomplete. But she had *all* the physical information. *Ergo* there is more to have than that, and Physicalism is false. Clearly the same style of Knowledge argument could be deployed for taste, hearing, the bodily sensations and generally speaking for the various mental states which are said to have (as it is variously put) raw feels, phenomenal features or qualia. (pp.471-472)

Rudd (1998), while accepting the validity of the "hard" problem, maintains that such arguments as the above are problematic in that framing the problem "in terms of qualia, inner mental *objects*, is to objectivize the subjective [the what-is-is-likeness of experience], to treat it as though it were a realm of mind-independent objects." (p.2) On his view,

> the fundamental problem for physicalism is not that some of the objects of experience may be non-physical, but that the notion of experience itself is not a physical one .. One can deny mental objects, qualia or whatever, or remain agnostic about them, but this does nothing to help the physicalist. What the physicalist has to show is that my consciousness, my awareness - whether of tables or colours, after-images or mountains - is something physical. (p.5)

Consistent with Griffin's (1998) position as described previously, Rudd maintains that "phenomenology just *is* the way things seem to us, so there is no room for an appearance/reality distinction [in the case of consciousness]" (p.3); in short, and as Searle (1992) states, "we can't make [an] appearance-reality distinction for consciousness because consciousness consists in the appearances themselves. *Where appearance is concerned we cannot make the appearance reality distinction because the appearance is the reality*." (p.122) Rudd is, thereby, led to maintain that "what is crucial is the issue of what it is like, not that of what is known." (p.5) It is significant to note that his

Wittgensteinian approach to solving the category problem is similar to that described herein, viz. emergently grounding ontical subjects and objects in ontological being-in-the-world (chapter 6). As he states,

> Wittgenstein attempts to dissolve the classic problems of mind and body and of our knowledge of other minds, by starting, not from the first [ontologically-subjective] or third [ontologically-objective] but from the *second* person. That is, neither from the introspection of the isolated subject, nor from the objectivity of scientific observation, but from ordinary human interaction. (p.6)

On this basis, he insists that "we should reject the philosophical project of taking science as metaphysics [that is, as ontologically primordial]" since "we can only integrate mind and body if we understand the body as we do in everyday life, and not as we do in science." Thus, "we need to think more about what can be called the body-body [or, more precisely, *person*-body] problem - the problem of relating our ordinary self-understanding as embodied agents to scientific accounts of the human body." (p.8) Clearly, this position corresponds to the Heideggerian project described herein, viz. explaining the *pluralistically-emergent* (or incipiently-*poiētic*) relation between the ontical (causal, productive) and the ontological (existential, hermeneutic) (chapter 6). A Heideggerian solution to the other-minds problem is outlined in section 7.4.5. However, it is appropriate at this point in the presentation to briefly examine the possibility of a non-Heideggerian emergentist - specifically, computationally-emergentist (chapter 3) - solution to the category problem.

7.4.3. Computationalism, Emergence and the Category Problem

Perhaps the most incisive critique of the conventional emergentist (or emergent-materialist) position - in which it is argued that ontological subjectivity (or experience) emerges from an ontologically-objective (or non-experiential) substrate - is that presented by Griffin (1988b), who maintains that

> materialists, in referring to perceptions, feelings, volitions, and conscious thoughts as *emergent properties*, claim that these inner properties are simply further examples of a long line of new properties which have emerged throughout the evolutionary process, such as bones, scales, and feathers. But this claim obscures the difference in kind involved. All those other characteristics are *externalistic* properties, knowable to sensory experience. But *experience itself* does not belong in this category. It is what an organism is *for itself*, not something that is observed through the eyes, ears or hands of another organism. We know what we *mean by experience* and hence can attribute it meaningfully to others only because of our own immediate experience. To put experience itself in the same class as those properties that are the *objects* of experience is a *category mistake* of the most eggregious kind. [Yet] it is only through this confusion that the materialist can claim to be different from the dualist. (p.147)

Moody (1993) defines a `category mistake' as "the result of grouping something in a category with other things that are logically dissimilar." (p.31) For example, Ryle (1949) contests the validity of Cartesian substance dualism on the grounds that

> the belief that there is a polar opposition between Mind and Matter is the belief that they are terms of the same logical type. (p.23)

On his view, the mind is not a substance, but a *property* or attribute of matter; hence to oppose mind to matter is to oppose substance to attribute which constitutes an instance of category error. However, while it *is* incorrect to maintain a polar opposition between mind and matter on the basis of identity of logical type, ontological subjectivity and ontological objectivity can legitimately be placed in polar opposition since they are instances of the same logical type, viz. perspective or *view* (Nagel,86).

In a later work, Griffin (1993) maintains that

> it is impossible to understand how experiencing things and nonexperiencing things [can] interact .. The evolutionary picture of the world creates a new form of [the mind-body] problem: how could experience have evolved out of things wholly devoid of experience ? It is often said that this is unproblematic, being simply one more example of "emergence": just as wetness emerges out of a combination of hydrogen and oxygen, neither of which is wet, so could experience emerge out of things which were wholly devoid of experience. This argument, however, involves a category mistake. Wetness is a quality of things as they are *for others*. We do not suppose that the water molecules feel wet to themselves. "Experience", however, is what something is *for itself*. To say that experience arose out of a constellation of things without experience, therefore that things that exist *for themselves* arose out of things that were *nothing* for themselves, existing only *for* others, is to postulate an absolutely unique type of emergence with no analogues. (p.193)

Finally, and in the specific context of the category problem, that is, the question of how ontological subjectivity can emerge from an ontologically-objective substrate, Griffin (1998) maintains that

> the alleged emergence of subjectivity out of pure objectivity has been said to be analogous to examples of emergence that are different in kind. All of the unproblematic forms of emergence refer to *externalistic features*, features of things as *perceived from without*, features of *objects for subjects*. But the alleged emergence of experience is not simply one more example of such emergence. It involves instead the alleged emergence of an `inside' from things that have only outsides. It does not involve the emergence of one more objective property for subjectivity to view, but the alleged emergence of subjectivity itself. Liquidity, solidity, and transparency are properties of things *as experienced through our sensory organs*, hence properties for others. Experience is not what we are for others but what we are *for ourselves*. Experience cannot be listed as one more `property' in a property polyism. It is in a category by itself. To suggest any analogy between experience itself and properties of other things as known through sensory experience is a category mistake of the most egregious kind. (pp.64-65)

This position is supported by Searle (1997), viz. "consciousness has a first-person or subjective ontology and so cannot be reduced to anything that has a third-person or objective ontology." (p.212) On this basis, Nagel (1979) maintains that "there are no truly [that is, *ontically*] emergent properties of complex systems. All properties of a complex system that are not relations between it and something else derive from the properties of its constituents and their effects on each other when so combined. Emergence is an *epistemological* condition: it means that an observed feature of the

system cannot be derived from the properties *currently* attributed to its constituents[65]. But this is a reason to conclude that either the system has further constituents of which we are not yet aware, or the constituents of which we are aware have further properties that we have not yet discovered." (p.182) Thus,

> unless we are prepared to accept the alternative that the appearance of mental properties in complex systems has no causal explanation at all, we must take the current epistemological emergence of the mental as a reason to believe that the constituents have properties of which we are not aware, and which do necessitate these results. (p.187)

Crucially, on his view, "it is conceivable in the abstract that if mental phenomena derive from the properties of matter at all, those may be identical at some level with nonphysical properties from which physical phenomena also derive." (p.184) In short, the ground of mind and matter is that which is prior to both. For Whitehead (1978), this ground is the actual occasion, the experiential event which has both ontologically-subjective and ontologically-objective (or superjective) aspects that disclose temporally. The problem with this scheme is that it fails to address the ontological difference between beings (actual occasions and compound individuals[66]) and Being *as such*; in short, it does not explain why there is something rather than nothing (chapter 6). In order to resolve this problem, Whiteheadian panexperientialism must be grounded in Being which, as shown in chapter 6, is, in some sense, the `same' as nothing, thereby entailing an incipient *poiētic* movement from Being to beings (subject-superjects), that is, ontological *creatio ex nihilo*. Thus, it appears that some form of *radical emergence* must, in fact, be correct. As stated above, Nagel posits some form of *neutral monism*[67] as the *ground* of both mental *and* physical phenomena. However, in order to prevent such a ground from undermining the transitivity of causation (by postulating it as a First or Necessary cause), it must be interpreted as a non-causal groundless ground or abyss and, as shown in chapter 6, this is precisely the meaning of incipient nothing or Being *as such* (*Seyn*).

The above endorsement of a radical emergentist solution to the category problem appears to support the possibility of "strong" computationally emergent artificiality or CEA (chapter 5). However, that this is not the case is readily established: The radical

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65 This position is consistent with Cariani's concept of emergence-relative-to-a-model (chapter 3) and Mead's pragmatist interpretation of emergence (chapter 6).

66 According to Griffin (1988b), in panexperientialism, "a clear distinction is made between *aggregates* and *genuine individuals*, with the insistence that only the latter have (or *are*) experiences. Accordingly, sticks and stones and stars are not thought to have experience as wholes. The *pan* in *panexperientialism* thereby means that all actual things either are experiences or *are composed* of individuals that are experiences. This point distinguishes this position from most other `animistic' positions." (p.152)

67 According to Mercer (1917), "in the Cosmos there is not only existence, but conscious existence; and consciousness must therefore be posited as an attribute or property of the Ground." (p.197)

emergentist solution to the category problem is not an ontical (that is, causal) solution but an ontological (that is, incipient) solution. On *pluralistic emergentism*, ontological subjectivity does *not* emerge from an ontologically-objective substrate but from that which is prior to such ontical *categories*, viz. non-categorial being-in-the-world (chapter 6); hence, the radical (or pluralistic) emergentist solution to the category problem involves *transcendence* of the categorial to its ground, viz. Being *as such*[68]. However, as shown in chapters 2 and 6 and again in sections 7.3.2 and 7.3.4, computation is "hard" (or pure) artifactual and its ontology is *externalistic* (objective, third-person) and *deterministic* (operationally-necessary). As a consequence of the ontological - that is, *categorial* - closure of computation, viz. computation gives rise to computation, it is impossible for computation to generate ontological subjectivity in which case *computational* emergence cannot solve the category problem. In this sense, computationalism is the metaphysics that is most vulnerable to Griffin's incisive criticisms of emergentist-materialism *and precisely because it is completely non-materialist*: Griffin's critique is directed at materialism *interpreted* (epistemically *a posteriori*) *as-if* externalistic. However, this interpretation is *contingent* since matter is ontically *a priori* (or *given*). Computation, by contrast, is *designed* (epistemically *a priori*) *as* externalistic and this design is *necessary* since computation is formally-specified (circumscribed) and ontically *a posteriori* (or *made*). It is important to appreciate that it is not simply the fact that computations are incapable of *semantic initiative*, that is, creating new symbolic primitives (Cariani,89), that renders them incapable of solving the category problem since on this view, categories are merely *epistemological* and ontologically-objective. As argued in 7.3.4, computation is incapable of *incipient poiēsis*, that is, emergence of existential modalities (or *ontological* categories, specifically of the category of ontological subjectivity).

7.4.4. *Technē*-Enframing (*Gestellen*) and The Category Problem

In the previous section, it has been shown that computationalism is incapable of solving the category problem which implies that both the computational theory of mind or CTMi (chapter 4) and "strong" AI must be impossible[69]. It is worthwhile briefly investigating the implications of this fact for the possibility of other "strong" artificialities such as A-Life. According to Keeley (1993),

> one of the things that makes psychology such a difficult endeavour is that in addition to the straightforward *behavioural*, third-person phenomena which stand in need of explanation, in the case of humans at least, there seem to be additional *experiential*, first-person phenomena. Part of the burden of psychology is to explain (or explain away) phenomena related to the *prima facie* claim that psychological systems exhibit attention, intentionality, consciousness, self-consciousness, a `point

68 To the extent that ontological categories are, they necessarily partake of Being *as such* (chapter 6).

69 The implications of this fact for computationally emergent artificiality or CEA and metaphysical computationalism are briefly examined in chapter 8.

> of view', or the property of being `something-it-is-like-to-be' that entity, qualia, or any other of the constellation of concepts relating to the subjective nature of the psychological. (p.584)

He goes on to state that "there is no analogous concern in biology" since "biological phenomena, unlike their psychological counterparts, seem to be exclusively of the behavioural, third-person variety. There is no worry that, after describing all the physical parameters of the system, there still will be `something else'." (p.584) However, if, as Searle (1992) and Nunez (1995) maintain, consciousness is a biologically-emergent property and if, as is implied by Keeley's above statement, biology can be defined in ontologically-objective terms[70], the category problem again arises *and this time in a biological context*. For this reason, Birch (1988) maintains that "the postmodern challenge to biology is to recognize a second set of causes in addition to exernal [or ontologically-objective] relations. This second set is internal[71] relations." (p.70) However, according to Farleigh (1996),

> the primary function of a machine can be described in terms of the external relations of the parts which are assumed to be `simply located'. One set of external relations is as good as any other, and hence the function of one machine can be modeled on another. The function of an organism on the other hand is constituted by both the internal and the external relations between events. Each event is not simply located, is unique to its history and is hence, highly context-dependent. The procedure, then, of attempting to map an organism onto a machine can only be a process of abstraction and hence such a mapping would be done with a loss of information and the two would not be functionally equivalent. The adherents of `strong AI' and `strong AL' commit the simple, but major, fallacy of confusing the abstract with the concrete." (p.17)

Birch maintains that "evolution, according to the ecological or organic model, is the evolution not of substances but of subjects. The critical thing that happens in evolution is change in internal relations of subjects." (pp.71-72) To the extent that Heidegger's identification of functionality with substantiality (chapter 6) and the metaphysical interpretation of the former in ontologically-objective terms (section 7.3) is correct, it follows that A-Life evolution is substantialist and hence, according to Birch's position, non-evolutionary (that is, non-emergent).

However, McGinn (1987) insists that "a non-living thing might .. in principle qualify for the ascription of consciousness, so long as it behaved like a living conscious thing, for example ourselves. Only such an entity could *invite* the ascription of consciousness." (p.283) This is only possible because McGinn holds that

> the intrinsic nature of an object is logically independent of the manner of its genesis (p.281),

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70 That is, if a behavioural explanation of a biological phenomenon is *sufficient*.

71 Here, internality is experiential (or first-person) and constitutive (section 7.2.2) as opposed to merely topological (or geometrical).

a position that is supported by Levin (1979). As he goes on to state, "if we know that an entity *a* has the same physical nature as a conscious being *b*, then we know that *a* is conscious in the same way as *b*, quite independently of whether *a* and *b* came into existence in the same way .. *Hence whether something is an artifact is irrelevant to the question whether it is conscious* [emphasis added]." (p.281) Hence, "all intelligence needs to do to create conscious beings is to recapitulate what natural selection did mindlessly. There is thus no problem in principle about an artifact being conscious." (p.281) However, according to Birch this position is problematic since if natural selection is responsible for the emergence of consciousness, it cannot be an ontologically-objective (or `mindless') process; hence, his postulation of the causal role of internal relations in evolution. Yet Birch (1994) does not exclude the possibility of experiential artifact construction, merely that "to attempt to *make* [an experiential artifact] by building up a hierarchy of compound entities that think and feel would be to attempt to repeat evolution from scratch [emphasis added]." (p.8) The problem with this position is that it fails to appreciate the *ontological implications* of the *poiētic difference* (chapter 6) between *technē*-Enframing (*Gestellen*) or *artificing* - which involves a productant (artificer-interpreter) relating to substratum (matter) and product (form) as an ontological *subject* to ontological *objects* - and *physis* or evolution - which Birch identifies as internalistically-relational; in short, artificing is relationally-externalistic whereas evolution is relationally-internalistic. Hence, artifacts cannot replicate evolutionary processes[72]. According to de Quincey (1994),

> compared with a `compound individual', an aggregate society of experiential events - such as a rock, a pool of water, a chair or a computer - has no dominant monad of experience. The rock, chair or computer is a non-holistic *aggregate* of constituent molecules, atoms and subatomic particles. Now, according to panexperientialism, each of these constituent lower-level `organisms' is an individual with its own low-level form of experience and capacity for self-action. However, in aggregates the self-motions of the innumerable individual organism cancel each other out. Consequently the rock, pool, chair or computer does not possess experience or self-motion of its own (just as we see in the world, and just as normal physics predicts). Therefore, in compound individuals and aggregates there is no fundamental conflict between panexperientialism and modern physics regarding constituent `particles'." (p.223)

The problem with this position is that in identifying rocks ("hard" naturals), pools (naturals or "soft" artifacts), chairs ("soft" artifacts) and computers ("hard" artifacts) as aggregates, de Quincey fails to appreciate the implications of the *poiētic difference* (chapter 6) and hence, the distinction between "soft" (or impure) and "hard" (or pure) artifacts with respect to the possibility for transformation into compound individuals. As

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72 Farleigh (1997) commits the same mistake in asking "can we artificially *build* an entity that is conscious ?" and going on to state that "I believe we can because consciousness is not some special stuff we have to add to a system. But what I don't believe is that it can be done on a machine - that is by an aggregate of individuals (the individuals being the molecules). If we could create a conscious entity I believe it would inevitably be indistinguishable from an organism - in other words it would have to be a compound individual of some sort. And of course it would be easier to *grow* such an entity than *to put one together* molecule by molecule [emphasis added]." (p.6)

Whitehead (1926) states,

> suppose for the moment and for the sake of simplicity, we assume, without any evidence, that electrons and hydrogen nuclei are .. basic organisms. Then the atoms, and the molecules, are organisms of a higher type, which also represent a compact definite organic unity. But when we come to the larger aggregations of matter, the organic unity fades into the background. It appears to be but faint and elementary. It is there, but the pattern is vague and indecisive. It is a mere aggregation of effects. When we come to living beings, *the definiteness of pattern is recovered, and the organic character again rises into prominence*. Accordingly, the characteristic laws of inorganic matter are mainly the statistical averages resulting from confused aggregates. So far are they from throwing light on the ultimate nature of things, that they blur and obliterate the individual characters of the individual organisms. If we wish to throw light upon the facts relating to organisms, we must study either the individual molecules and electrons, or the individual living beings. In between we find comparative confusion [emphasis added].(p.133)

7.4.5. A Heiddegerian Solution to the Other-Minds Problem

Goswami (1993), assuming an idealistic interpretation of quantum theory, argues that the other-minds problem[73] (chapter 4) is not a problem for human beings since, unlike machines, their consciousness is connected non-locally:

> The reason that I do not live in a solipsistic (only I am real) universe is not that others like me logically convince me of their humanness, but that I have an inner connection with them. I could never have this connection with an android [or zombie]. I submit that the sense we have of an inner connection with other humans is due to a real connection of the spirit. I believe that classical computers can never be conscious like us because they lack this spiritual connection. Etymologically, the word *consciousness* derives from the words *scire* (to know) and *cum* (with). Consciousness is `to know with'. To me, this term implies nonlocal knowing; we cannot know with somebody without sharing a nonlocal connection with that person. (p.23)

Consistent with this position, Midgley (1995) maintains that the other-minds problem dissolves once the essentially *social* nature of human beings is recognized; on her view, the problem can only arise for philosophers who are prone to committing "Cartesian philosophic suicide" (p.352). This position is similar to that argued by Heidegger who asserts the ontological primordiality of human being as being-in-the-world over the

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73 *The Oxford Companion to The Mind* (1987) defines the other-minds problem as "the classical problem of why we believe that other people (and perhaps at least the higher animals) have sensations, thoughts, and so on, essentially similar to our own. It seems that we draw a widespread analogy from our own behaviour, and related internal affective states, to the internal states of other people (and sometimes animals), especially when their behaviour is similar to ours." However, the logical possibility of zombies (chapter 1) undermines the validity of this *behaviouristic* argument for the ascription of mentality. Furthermore, this position, in its refined form, assumes the validity of functionalism and multiple realizability, viz. that the *genesis* of a thing is irrelevant to the question of whether it has a mind. However, if Heidegger is correct in maintaining that becoming and Being stand in essential, unitary relation, then a difference in *poiēsis* (coming-forth, bringing-forth, becoming) between beings entails a difference in Being (ontology) between beings, viz. an *ontical difference*. On this basis, it is possible to argue that a thing does not have a mind on the grounds that its *poiētic*-historicity is *essentially* distinct from that of a mental thing.

Cartesian ego (chapter 1). According to Grimsley (1967),

> strictly speaking, we cannot `prove' the existence of other selves any more than we can prove the existence of the external world. It is simply unthinkable, however, that there should exist an isolated self without others. (p.50)

This clearly follows from the fact that the very notion of *self* is meaningless without that of *other*: Following Heidegger's (1959) assertion to the effect that that which is in opposition (*polemos*) must constitute an originary unity, it is maintained that the duality of self and other points to a prior composite, viz. self-other. Furthermore, if the primordial way (or mode) of Being is being-in-the-world, of which being-with-others is a component existential structure (chapter 6), then the other-minds problem is not a primordial but rather a derivative problem. According to Kovacs (1990),

> the phenomenon of `with-being' and the phenomenon of `There-being-with-others' [such `others' being, of necessity, There-beings themselves] reveal a fundamental (ontological) structure of There-being, and they show this structure as being equally original with the to-be-in-the-World. This structure is the existential called `with-being' (`to-be-with'). The `with-being' structure of There-being is the foundation of human community and of interpersonal relationships; it is not the product of social or cultural integration. (p.72)

However, why should (must) this other be a self ? Is solipsism impossible ? For Heidegger, solipsism is a possibility posterior to the emergence of the Cartesian ego (subject, self) from *Dasein* (or being-in-the-world). To the extent that a basic existential structure of Dasein is being-with-others, other-*Daseins* necessarily exist. In this sense, other selves *are*; however, these selves are not Cartesian egos. Yet to the extent that there are a plurality of *Daseins* and given that every *Dasein* has the possibility of becoming a Cartesian ego, it follows that there must be a plurality of minds. In considering four arguments against "strong" AI, viz. consciousness, autonomy, intentionality and unity, Hauser (1993) is led to maintain that

> *if* consciousness *were* our basis for deciding whether any intelligent seeming thing was really a thinking subject, then one *should* have skeptical doubts about other minds. So, if we don't, and shouldn't, seriously entertain such doubts, this seems to show that we don't (or shouldn't) appeal to consciousness to decide what is and isn't thinking. (p.2)

This position is significant since it establishes how the possibility of "strong" AI arises, viz. from the assumption of Cartesian subjectivity as primordial. Far from being anything other than an ultimately solipsistic argument against "strong" AI, Cartesianism supports "strong" AI because Cartesianism is the context in which the other-minds problem makes sense. On Heidegger's view, it is being-in-the-world which is primordial and neither ontologically-subjective nor ontologically-objective since prior to this Cartesian duality (which is emergent relative to originary *Dasein*). But is it not possible that "strong" AI can instantiate being-in-the-world ? The answer to this question is grounded in the link between the latter and Being *as such*: Being-in-the-world is an emergent *gestalt* from Being which comes-forth in the *poiētic* mode of *physis* (chapter 6). Hence, the issue turns

on the whether the *poiēsis* in artifacts and naturals is identical. If the Being of a being is continuous with its becoming then beings can be differentiated on the basis of their respective modes (or ways) of becoming. To the extent that there is a *poiētic difference* between naturals and artifactuals, the Being of each is distinct. Furthermore, given that the Cartesian subject is emergent relative to being-in-the-world in the case of naturals, while the artificing subject (productant) and its objects (substrata) are prior to `emergent' `being-in-the-world' (product) in the case of artifactuals, it follows that the becoming - *and hence, Being* - of being-in-the-world and `being-in-the-world' are not identical.