

Cosmic art pedagogy for the anthropocene era

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Abstract

This essay attempts to shift the ontological ground for art education to think along a cosmology that is adequate for the Anthropocene era. The cosmic-eco-artisan (without authority) is forwarded as an exemplar of what Deleuze and Guattari would call 'conceptual personae'. Their cosmic geo-philosophy plays a dominant role in this essay. The point is made that each eco-cosmic project is a singularity and context bound. There is no art education or procedural 'methodology' per se. Rather, what is necessary is for art pedagogy to address the Anthropocene problematic through artistic cosmic 'forcework' via a techné; that is, through apparatuses which bring art and science together. I call this artscience or scienceart depending on where the emphasis is placed. I end this essay with several paradigmatic examples to vivify this thesis.

Keywords: Cosmic pedagogy, Cosmic artisan, Ecology, Anthropocene, Deleuze-Guattari, Technology.

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Pedagogia da arte cósmica para a era antropocênica

Resumo

Este ensaio tenta deslocar o terreno ontológico da educação artística para pensar uma cosmologia adequada ao Antropoceno. O artesão eco-cósmico (sem autoridade) é apresentado como um exemplo do que Deleuze e Guattari chamariam de “personagens concetuais”. O seu projeto eco-cósmico apresenta-se como uma singularidade vinculada a um contexto. Não há, pois, educação artística ou “metodologia” procedimental per se. Em vez disso, o que é necessário é que a pedagogia da arte aborde a problemática do Antropoceno através da artístico-cósmica ‘força de trabalho’ via uma dada *techné*; isto é, por meio de aparelhos que unam arte e ciência. Algo que denomino por “artociência” ou “ciençarte”, dependendo de onde se quiser colocar ênfase. Termino este ensaio com vários exemplos tidos por paradigmáticos para vivificar esta tese.

Palavras-chave: Pedagogia cósmica, Artesão cósmico, Ecologia, Antropoceno, Deleuze-Guattari, Tecnologia.

Pédagogie de l'art cosmique à l'ère de l'anthropocène

Résumé

Cet essai tente de déplacer le terrain ontologique de l'éducation artistique pour penser une cosmologie adéquate à l'Anthropocène. L'artisan éco-cosmique (sans autorité) est présenté comme un exemple de ce que Deleuze et Guattari appelleraient des “personnages conceptuels”. Son projet éco-cosmique se présente comme une singularité liée à un contexte. Il n'y a donc pas d'éducation artistique ou de “méthodologie” procédurale en soi. Il faut plutôt que la pédagogie de l'art aborde la problématique de l'Anthropocène à travers la “force de travail” artiste-cosmique via une “techné” donnée; c'est-à-dire à travers des dispositifs qui unissent l'art et la science. Quelque chose que j'appelle “artoscience” ou “sciençart”, selon où l'on veut mettre l'accent. Je termine cet essai avec plusieurs exemples considérés comme paradigmatiques pour vivifier cette thèse.

Mots clés: Pédagogie cosmique, Artisan cosmique, Écologie, Anthropocène, Deleuze-Guattari, Technologie.

Prelude

This essay builds on a string of previous essays (Jagodźinski, 2015, 2018, 2019a, 2020, 2022) where the 'conceptual personae' of the cosmic-eco-artisan is put into play, a figure so invented to create new concepts for art and its education in the era of the Anthropocene. I draw on the philosophical oeuvre of Gilles Deleuze and Félix Guattari throughout this essay to make my case. There are many 'difficult' concepts which may prove frustrating if the reader has no familiarity with their writing (such as 'conceptual personae', for example which they develop in *What is Philosophy?*). I make no apologies for this as their philosophy has had a broad engagement in various artistic fields. A certain patience and rereading may be required as the attempt is to claim that an adequate artistic pedagogy to face the problematic of the Anthropocene, euphemistically termed 'climate change', has yet to take 'root'. What is being explored is therefore more of a conviction, a plea, and an urgency that, perhaps, is already too late in its call.

Art and its education have been characteristically and historically conceived as a self-expressive endeavor, a 'human-all-too-human' initiative instrumentalized as a 'secondary' subject in public schools to boost cognitive abilities, elevated as a 'biographical' form of expression for mental health. Often, art is perceived as a spiritual undertaking for transcendentalist views of unification, and in its social capacity for ethico-political influences on spectators for nation building and ideological imaginaries. Arts based research in particular bears the weight of anthropocentrism and (post)humanism by way of undertheorizing the technological (inhuman) forces shaping our *species-becoming*, as well as furthering various sociological quagmires that have led to the hardening of identity politics by elevating 'diversity' with no way out. The 'force' of affect has become an academic preoccupation in virtually every field, raising issues of *aisthesis* vs. aesthetics, the latter perceived as shaping forms of categorical representation, while the former is now being discussed in neurological 'en-mindment' terms where technological externalization (what Michel Serres, 2019, called exo-Darwinism) profoundly affects our species physiology and psyche, rather than simply a question of 'embodiment' as defined by biological discourses. Technicity modifies the species Homo, to extrapolate from Bernard Stiegler's (1998) trilogy on technology.

The Anthropocene presents the foremost challenge to our species, requiring a pedagogy that reorientates itself to the ecological challenge that is upon us. From what has been outlined in the opening paragraph, the following essay is to promote a turn towards what I refer to as a *cosmic pedagogy* based on an arts/science and science/art problematic, which recognizes the materiality of *apparatuses* and *assem-*

blages (agencements) created by a network of scientists and artists globally who can be identified as cosmic-eco-artisans through the 'singularities' of their projects in addressing an Anthropocene 'problematic'. In this sense, I am sympathetic with Geert Lovink's (2019) own musings of an "avant-garde of the commons". As he writes, "a diverse ecology of interconnected, autonomous DIY infrastructures that function as a blueprint for larger public initiatives in the near future" (p. 141). Such teachers, artists, designers, scientists are not organized and neither are they managed; rather "it is the real-time regimes that [they] need to confront ... in a world dominated by the permanent present" (p. 149), and that world is the Anthropocene. Attempts at de-anthropocentrism and de-subjectification are made to address and vivify the forces of the Earth and our anthropogenic involvement in its phase shift that is now taking place. Art education here has no set methodology, but it does, as Deleuze and Parnet (2007) remarked, "a very lengthy preparation, yet no method, nor rules, nor recipes" (p. 8). It is, rather, a *posture* of care that examines the interlinks between science|art through the invented *apparatuses* by scienceartists and artistscientists to envision new imaginaries that might solicit new energies to offset the postcapitalist shift towards the claims of a 'good Anthropocene' as mapped out by an 'ecomodernist manifesto' (Asafu-Adjaye et al., 2015), promoted, for instance, by the Breakthrough Institute where (most often) 'green capitalism' is the cover term that continues to exploit resources under claims of job creation and economic growth.

The problematic of the Anthropocene calls for an art pedagogy based on, what I have called elsewhere, 'an avant-garde without authority' (Jagodzinski, 2010, pp. 109-123). Historically, art and its education often lag in relation to what are already artistic explorations of a changed ontology. At the turn of the 20th century when various 'modernisms' emerged exploring the changed relation to space-time continuum brought on by the *electric age* (i.e., Herwitz, 2000), art in schools was still caught by mechanical drafting and representational realism. It was only after WW2, in the early 50s, before there was some movement in public schools to bring modernist ideas into the classroom. In the United States, in particular 'abstract expressionism' exemplified the creative abilities of the individual artist. This was in reaction to communist realist aesthetics so as to promote the ideological claims of capitalist democratic 'freedom' in distinction to the Eastern bloc's communist ideals (Guilbaut, 1985). Such modernist influences were further supported by many artists escaping Nazism into the US where influences of the Bauhausian principals of design became established by the influential figures of Walter Gropius, Josef Albers, and László Moholy-Nagy. The story of art education was, of course, quite different in the European context that had been devastated by the war. To recall, a fascist aesthetic of realism dominated, while modern

art was considered degenerate. This same lag is evident today as the 21st century is characterized by biological sciences (DNA research and bio-engineering) and digital computation that are pervasive in an electronic age (Rifkin, 1999). Artists/scientists have explored this shift via telematic, bio-art and transgenic art that preoccupied many of them in the turn of the 21st century. These developments have transmuted into cosmic-eco artistic explorations as the aftermath of the event of the Anthropocene has begun to unfold. Such developments remain out of public classrooms, and often removed from discussion as some art educators have identified (Bertling & Moore, 2020). As James Elkins (2014) has documented, there has been a growing attempt in the past decade to bring this conversation into art schools and university fine art departments to recognize the interdisciplinarity between arts, sciences and technologies. Installation (*thesis*) art is precisely this where there has been a new coming together of art and technics [*technê*] (more below). What follows, then, is to give further articulation of what such a shift in orientation would require to grasp a fundamental change in an art pedagogy that embraces the need to reorient itself to the Anthropocene problematic.

Materiality?

What would an art education that engages with the Anthropocene problematic require, or consider? Materiality has obviously become a central issue in relation to the overwhelming awareness of an ecological ethos that pervades the euphemism 'climate change'. The moniker 'new materiality' has become popularized in many feminist circles (Alaimo & Hekman, 2008), furthering ecofeminist movements in art that became paradigmatic in the 70s and 80s (see the historical review by Monika Fabijanska, 2020). Materiality, however, is one of those 'empty signifiers' that takes on meaning depending what discourse, theory and situation is in play. Matter, materiality, immateriality, and nature tend to coalesce together. Materiality and materialism are often confused as well. The posture taken here is that the signifier 'cosmic' draws attention to a particular orientation and approach to materiality in relation to the Anthropocene, which is required for such an art pedagogy that adequately confronts its challenges. The geo-philosophy of Deleuze and Guattari weighs heavily in this context as the question of 'matter' as it pertains to 'nature' is of issue. Materiality has always been of concern when it comes to art and design processes. Materiality now includes the entire microbiome of the body. 'Body art' has been extended by artists growing their own germ cultures to produce 'bio-portraits'. Such artistic explorations

require a paradigm shift in art education's approach to the performative affects of art that rethink arts-based research which too often continue postmodernist values where a world-for-us remains primary, paying less attention to the world-in-itself and for-itself, a world, that is, without-us. This is the realm of anorganic life (also nonorganic life) in Deleuze and Guattari's (1987, pp. 279, 411, 503) terms. That is, uncontrollable life, life that is creative as it is destructive. I refer to it as the *cosmic dimension* in my discussion as these are the forces that cosmic-eco-artisans must intuit, which is to say the rather uncomfortable recognition that the 'Earth' is not ours to save. 'Nature' (materiality) is indifferent to our existence, yet we must generate relations with such 'indifference' for our own well-being necessitating a rather different pedagogical relationship (jagodzinski, 2021a). Historically, this relationship between nature and culture has been described as hylomorphic where object-subject correlation defines agency, now widely understood as 'correlationism' as articulated by Quentin Meillassoux (2010). The reorientation to hybridic naturecultures defines the cosmic orientation of artistscientists and scientistartists. Elizabeth Grosz (2005), for instance, sees this development as "the becoming-artist of scientific knowledge and the becoming-scientific of artistic creation" (p.12). This contemporary 'ontological turn' (Holbraad & Pedersen, 2017) in anthropology was already in place with Deleuze and Guattari (2004) when they emphatically stated: "We make no distinction between man and nature: the human essence of nature and the natural essence of man become one within nature in the form of production or industry" (p. 4). Startling even in this contemporary moment of time.

The seminal works of Gilbert Simondon (2020) have been widely quoted as providing the necessary conceptualizations to overcome the hylomorphic tradition as established by Aristotle, which has persisted in artistic creation where anthropocentrism becomes central. In its most intense form, this amounts to the ability to 'create' synthetic life; that is, the ability to manipulate nature at nano lengths and times, and to create new physical elements that add to the Periodic Table of Elements. Hylomorphism elevates the 'will' of the artist to exert and impose form over what is generally perceived as passive material. While material is not entirely passive, the celebration of the artistic idea through form persists. Historically, in the German context 'Kunstwollen', a concept coined by Alois Riegl, was the general term used to indicate a particular artistic will that defined an age, stemming from Hegelian influences of a *Weltgeist*. Riegl's historiography is one of the earliest attempts to bridge art with science, cognition and affect (Vassiliou, 2018). This legacy continues, for instance, when we ask: 'What is contemporary art?' The posture taken here for art education is indeed to maintain that an epochal shift has taken place, however, the ontological

place of the artist within the artistic process and the problematic encountered has changed as well, and this has major consequences for education. To recall Jacques Derrida (1997): “The future can only be anticipated in the form of *absolute danger*. It is that which break absolutely with constituted normality and can only be proclaimed, presented as a *sort of monstrosity*” (p. 5, added emphasis). While Alfred North Whitehead (1968) observed: “When fundamental change arrives, sometimes heaven dawns, and sometimes hell yawns open” (p. 95). The Anthropocene future, in this sense is ‘monstrous’ and ‘hell’ is certainly ‘yawning’ as the Earth ‘deterritorializes’ itself. All this is to say ethical caution and care should prevail in any undertaking – from ‘fracking’ and nuclear energy to claims for wind and solar power. In this sense, Simondon intervenes but modifies and adds complexity to this tradition of *Kunstwollen*. He offers an understanding of artistic-design processes which dispels correlationist ontology deeply Kantian in its modernist roots. The intricacies of correlationism, in both its weak and strong forms, has been credited to Quentin Meillassoux (2010) where, in a nutshell, “the idea [being that] we only ever have access to the correlation between thinking and being, and never to either term considered apart from the other” (p. 5). Put more prosaically, correlationism amounts to the various possible entwinements between subject and predicate (object). In distinction, ontogenesis and individuation in Simondon’s developments are shown to be of key concerns for cosmic-eco-artisans as justified below, which more than worry the hylomorphism of correlationism.

Rethinking artistic processes

Simondon’s paradigmatic example is that of making a clay brick, which seems rather reductionist and simplistic at first glance, but it is enough to dispel the idealism of the artistic design process, and the importance of materiality. The indefinite plasticity of clay is abstract matter full of potential energy while the brick is an ‘abstracted form’. To achieve this form, however, requires a *technical operation*. Such relations are not established between the raw material and the pure form, but between *prepared matter* and materialized form, which require energy exchanges. The form produced becomes a ‘topological limit,’ while the prepared matter transports potential energy, which itself changes composition through technical manipulation. Simondon insists on the transformation of matter at the molecular level. He describes the various forces that are applied to the molecules of clay inside the mould [Br. spelling] to vivify the importance of each element that is involved in the process of fabrication.

The species of wood used for the mould, the temperature required, the skill of the worker in terms of exerting pressure, are all involved in the artisan making a 'simple' brick. The art of mould construction remains one of the most delicate operations in a foundry. Two heterogeneous processes (clay preparation and mould preparation) come together to 'resolve' the problem of making a brick. A 'brick' as a 'thing,' is only a thing by virtue of the active dynamic processes that allow it to take a particular form.

The relation of art and technics has historically been one of engaged ambiguous antagonism (at least in the West), a division between the 'freedom' to create and the necessity of engineered rules and calculation, between 'fine arts' and 'industrial design'. For Heidegger, the liberation of technics was always a 'liberation' from technology used instrumentally, rationally, and functionally [*Ge-stell, enframing*] towards the more important relation – that relation being a spiritual 'truth' [*Aletheia*], the unconcealment or disclosure of Being [*Dasein*], that is, the 'reveal' of art about the human condition when a 'clearing' [*Lichtung*] takes place. A transformation of technics was required as Heidegger had no interest in technical objects for their own sake. In contrast, this is precisely what interested Simondon: the evolution and associated milieu of the technical object itself. Freeing or 'liberating' the technical object in this case meant opening it up to allow for new inventions that brought it closer to the artistic imagination. He was interested in the technical object's 'individuation'; that is, how and why an object is subordinated symbolically, economically, and personally. In an age of surveillance capitalism of platform social media (Zubkoff, 2019), virtual and augmented reality, non-fungible tokens (NFTs), and the Metaverse, Simondon's 'call' was how to 'liberate' such technics that are caught by commodity fetishism towards more open 'artistic' ends. Contemporary artists who question technics as objects, who explore and modify their *dispositif*, are engaged in works of art that directly address the planetary condition. Forays into the chimaeras of bioart (e.g., Eduardo Kacs), interfaces with animals (e.g., Natalie Jeremijenko, Tomás Saraceno), interfaces with nature (e.g., Mark Dion, Anaïs Tondeur, Olafur Eliasson), with machine themselves (e.g., AI artists, Memo Akten, Sougwen Chung, Mike Tyka) and so on, have become ubiquitous. Such explorations open up the unexpected, the unplanned and are 'shocking', genuinely surprising. These are all artsScientists. "Not only does each [art]technology [as techno-art] rely on a certain *force of nature* but each one of them also produces a certain nature" (Lindberg, 2017, p. 148, added emphasis). The art of techno-nature's engagement with geopolitical issues as 'cosmotronics' (Hui, 2021) is crucial for the cosmo-eco-artisan. This is a 'materialism' which is transforming the relationship between art and technology where the artsScientist-scientistartist are the emergent personae engaged with the Planet. They speak to the uncanny and the disastrous possibilities (like Chernobyl and Fukushima) as the cosmology of

the anorganic is engaged. I call this development 'an avant-garde without authority' (Jagodzinski, 2010). They are an 'avant-garde' in the sense that their art calls for a future and a 'people yet to come' to inhabit its imaginary into being (Deleuze, 1997, pp. 216, 221). Such art sets out to deploy the potential that is the future into the present. This is not to anticipate a future, securing the present against it; nor is it preparing the ground for seeing the inevitability of a future (e.g., apocalypse, disaster), rather deployment of the potential of the future is to intensify the present, to open up the indeterminacy of the not-yet. They are 'without authority' as they present an ethical stance not committed to set moral laws.

I point to the above paradigmatic operation of making a 'brick' to make a number of points necessary for cosmic-eco-artisans who attempt to make visible the invisibility of the earth's phases change. The first, and perhaps most obvious, is the necessity of art and science to come together in relation to forces of materiality; that is, the affordances/potentialities that any material has that are yet to be discovered; the molecular structures in play and the kind of 'apparatus' that mediates such forces to achieve certain results. Second the idea of experimentation where each iteration may lead to a breakthrough or a failure. Experimentations in both art and science are fraught with struggle, uncertainty, frustration, disappointment, and (yes) illuminations that lead to new insights, but also new problems. Such a creative process must face contingencies, uncertainties, and unknowns: what Deleuze and Guattari refer to as the 'outside' that demand intuitive speculation. In this case the cosmic-eco-artisan must build an apparatus (a mould in this case) that will release the clay as it dries without cracks or damage to its definite contour. The technical apparatus has to be up to the problem at hand. Every ceramist, for instance, is aware of the various consistencies of clay bodies, how such clay 'bodies' are formed in the textual mixes that are brought together which then provide a potential range for each clay body's plasticity and firing temperature, as well as their color when bisque-fired, and so on. It is a finite process but one that opens up to the infinity of the 'outside', like the throw of a dice, as Deleuze maintains, that leads to endless possibilities when the idea of 'a dice' is no longer conceived as a set topological form, but a process of 'becoming' charged by exchanges of energy, hence, cosmic. And, why roll the dice in the first place? It is to 'play' with an enigmatic problem that searches for experimentation of which the artisan is but one factor.

Clay preparation is both a technical and experimental process. The eco-artisan becomes 'cosmic' in this assemblage (*agencement*). Why? We can think that the metastable state of material is held together by a 'strong' nuclear force, one of the four identified physical forces. This can be extended to analogies such as habituation

(patterns), molarity, set methodology, repetition as a *Wiederholung*; that is without change. A 'weak' nuclear force is present in the modulation, that is, the changes that take place at the molecular level of the material (clay) as it undergoes changes. The weak forces identify molecular breakdowns, changes that are happening at the quantum levels. Following Jacques Lacan and Deleuze's transposition, this is a *Wiederkehr*; change with a difference. The electric and the magnetic force (electromagnetic energy) takes place in the transformation of the material itself, while gravity comes into play in terms of the mass of the particles in use. The mould, in this exposition, is the 'apparatus' that facilitates the shift from a 'pre-individual state' of the substance to the finished form of the product (the 'individual' brick emerges from an individuated process) with the artisan mediating this process. The brick is a new metastate, which can be modified further yet. The intensive variations of forces and materials becomes in-form-ation; information in this case are signs that are being emitted which modify and change matter as to how well the apparatus (i.e., mould) is 'working'. To be clear, the temporality of the process and the emergence of a temporary form can be likened to a pedagogical process as well. We can think of the teacher as a catalyst in the way that the mould is not a 'set' form, rather, it is more of a sign emitter, undergoing modulation in the process of formation. The worn-out adage that the teacher 'moulds' students, with its obvious connotation of standardized 'bricks', is deeply flawed and misleading, reducing the complexity of the natureculture that forms from such processes.

The significance of Simondon for art and its education is mapped out nicely by Andrew Lapworth's (2016) analysis to decenter and question anthropocentric thinking in relation to his analysis of bioart where nonhuman agencies cannot be avoided. Lapworth offers three significant implications for a revised ontology of artistic creation. First, Simondon points to the transductive emergence of becoming that shape pre-individual reality. The point being that all identity is in a metastable state subject to ongoing transformations. Second, the autonomous individualist volitions of the artist (the will) are displaced by the involuntary primacy of material encounters that condition artistic responses. The relationality and affects of such exchanges make a difference (or not) in opening-up changes to thought and habituated behavior. And third, such potential changes that destabilize and disturb the metastable state of the individual are ethico-political as they refer to an ontogenetic process by which material production of new sensibilities emerge that transvalue the world of the subject; this 'subject' would refer to the artist-student in the context of artistic pedagogy, or the arts scientist as researcher in terms of developing a problematic.

Relationality and affects at the pre-individual level are where transvaluations take place, below the level of consciousness and below cognition. Issues of climate change, the COVID pandemic, abortion, racism, and other 'impossible' issues that shape belief systems, which are often divisive and immovable, are the Ideas that structure a metastable state. These are 'germinal' Ideas, but how they unfold and are actualized is a transindividual process, a process where subliminal persuasion, hypnosis, suggestion, and the rhetoric of reiteration are some of the more pre-cognitive and affective processes that play, change as well as stabilize belief systems (Blackman, 2012). We can think of them as incorporeal *energies* in play in such transindividual processes. Disturbances at the affective level, the neurology of intensification and excitation, including divisiveness as in propaganda media, are all dimensions of what has been called the *aisthesis* of sensibility, otherwise known as 'affect studies', through which various art disciplines directly address embodied perception through configured (designed) blocs of sensations (affects). The brain is not a 'thing', but needs to be understood processually as a set of potentialities, which are co-produced and co-constituted in relation to a particular milieu, setting and context. Simondon provides a way of theorizing the interconnectedness or entanglements of bodily affect and such im/material processes. These affective forces are nonconscious, visceral and proprio-centric, connecting bodies by contagion.

Art and its education from this perspective, is not only a matter of emotions and feelings of singular bodies, but the recognition of the trans-subjective processes that connect bodies – the performative force of art where distinction between space and time and the human and non-human are collapsed. Simondon refers to such a process as transindividuation where the 'I' and the 'We' transform coterminously. It requires an 'adjustment' in conceptualizing arts-based research where affect is not just an amorphous intensity or set of intensities, a formless flow of energy through bodies that is captured by the terms 'emotions' or 'feelings'. Rather affect is part of the process through which adjustments are made as well as to the milieu, adjustments made by human subjects that are not just 'singular' or one-sided in themselves but involve 'multiplicity'; that is, the process of individuation where there is a shared dynamic attunement that links human and non-human actors. This becomes a mediation between them through the technical actualization of potentiality that is found in the 'ecology' of the situation (milieux, environment, its multiplicity). *Immaterial dispositions* are what art education recognizes as art's ethico-political effects, which ought to be directed towards the Anthropocene era. Individualism is replaced by individuation that recognizes encounters as events that precipitate new feelings, thoughts and ways of acting differently than what has been habituated (patterned), clichéd or become

common doxa. Here we have a connection with Heidegger's *Ereignis*, his term for event that happens in the 'clearing' [*Lichnung*]. Such events occur at the limits of a metastate and can be understood after Deleuze and Guattari (1987) as entanglements of machinic material and incorporeal relations. These incorporeal relations usually go under the signifier of affect, but affect that includes allure, and aesthetics of cosmic elements, suggestion, wonderment, and so on. Transindividuation occurs in contexts when it becomes possible for a new assemblage (*agencement*) to emerge, with new potentialities and desires as various individuations coalesce together to form a I/We, now not as a nebulous Dasein, as in Heidegger, but extended to more-than-human relations, which include the non-human (organic and inorganic-mineral) and the inhuman (artificial intelligence).

Assemblages (*agencements*), as 'popularized' by post-Deleuzeguattarian studies refer to the affective, cognitive, practical, and embodied entanglements that are held together in a metastable state through symbiotic desire. Apparatuses, on the other hand, generally credited to Karen Barad (2007) by 'new materialist' feminists, can be understood in a narrower sense as the *technical* means for assemblages to hold together. There is a differentiation to be made between these two theoretical positions (jagodzinski, 2021b). Machinic is more literal here as it becomes crucial to understand artworks as apparatuses that operate performatively, harnessing and bringing together affective forces; in short – the concern here is with design as *techné* that draws on the available state of the technology as well as on the affordances (*qualia*) of material that are not pre-determined, but emerge through the inventive exploration of form. *Techné* it seems to me is an equivalency of the term apparatus as it applies to science, media and art. For the Anthropocene, the art apparatus must be performative and involve in some form the viewer within its workings to vivify and transfer its problematic. The performative aspect means that the cosmic-eco-artist must 'harness' the forces of materiality to disturb the seemingly 'normativity' that all is 'business' as usual, so that the ontological foundations of what is happening needs to be made visible. In another context, I have made a differentiation between a *techné* that dominates and controls (*Macht* technologies) and *techné* that enables a 'letting-go', 'letting-be', or 'letting-it-happen', which furthers new potentialities (*Lassen* technologies) (jagodzinski, 2019b). It is the later *techné* that art and its education should pursue as it characterizes the endeavours of cosmo-eco-artisans where the created artwork enable a 'becoming' of receptivity towards it. A letting oneself to be 'used' (affected) by it.

If we go back to Simondon, the question he poses and attempts to solve is: "How is the coming together of heterogeneous states to be resolved despite the disparity

between them where, at first, there seems to be no interactive communication?" Simondon develops the concept of 'disparation' to solve this problem, which has resonances with cognitive dissonance, a psychic tension between organism and milieu that ends in a (re)solution (Heaney, 2019). Simondon's paradigmatic example of such resolution is binocular vision where the 'disparity' between the left and right image is overcome to provide meaning (*sens*) as in-form-ation. Form becomes information. But, perhaps, a better grasp of the process of disparation is to consider the brain itself: its left and right hemispheres, each with their own unique modalities, are able to create a new metastable field or dimension via a 'difference' or incompatibility when creating the new that was not contained in the initial problem: like oil and water that do not mix yet become soap via sodium hydroxide as the essential catalyst. Disparation is the process of genesis that actualizes the potential that then comes together and expresses itself. Science and art, each working at their boundaries, create the new that arises out of their heterogeneity as ineradicable differences. This is why Deleuze and Guattari (1994) in *What is Philosophy?* claimed that art needs non-art (i.e., science) and science needs non-science (i.e., art). The apparatus (as *techné*, i.e., mould) mediates the disparate elements, forces or series. Disparation as an ongoing process is what Simondon and Deleuze call a 'problematic', as one possible new actualization leads to the next, what Simondon refers to as transduction. Art always plays a paradoxical role, as philosophical renewal merges from it. The idea of an 'avant-garde' is rightfully conceptualized in this regard: as opening the unthought, surpassing any enframed images. To once again recall the 20th century modernist movements: the phenomena of the various *-isms* only emerged after the 'fact'. There was no Cubism, or Surrealism ... or, until it was so 'named' conceptually. Each '*-ism*' generated its own bloc of affects to name a part of the experience of the 20th century as new technologies emerged, new communication possibilities (telegraph, telephone) to grasp a changed ontology. This is the concern of the 21st century where the Anthropocene dominates a changed world-order, where there is an extraordinary denial of the catastrophe that is taking place, not unlike the COVID pandemic.

Paradoxes of thinking otherwise

In *What is Philosophy?* Deleuze and Guattari (1994) work out three independent, yet entangled or intra-related, planes of in-form-ations – art, philosophy, science – which constitute three successive moments in a single process of genesis that leads from an undifferentiated chaos to propositional consciousness – a *chaosmos* that is an infinitely open and renewable system drawing energy from anorganic life. The creative use of

these three independent and intra-related forms via interconnections and connections leads to life of constant renewal, what Simondon theorized as a transductive process where the 'germ' or 'seed' as a new structuring element introduces a disruption, a resonance of heterogeneous elements to start the process of individuation that leads to transductive disparation and the reconfiguration of the field (ecological niche, milieu). The Earth both creates nature and simultaneously 'destroys' it, constantly 'deterritorializing and reterritorializing itself'. This Deleuzeguattarian concept the embraces life|death is fundamental to thinking the Anthropocene: Nature is constantly renewing itself; it is in a state of constant becoming as mutable transitions or phases take place in 'deep time'. We can project that the entanglement of art (right hemisphere) with science (left hemisphere) produces the 'new' depending on which modality is forwarded: artscience or scienceart. Both require conscious expression through philosophy that articulates the conceptual basis to grasp the new emergent sensibilities (i.e., *Kunstwollen*), or the new emergent mathematical formulations (i.e., quantum mechanics). The 'event' has to be conceptually named in some way (as was each modernist '-ism'). We can say that this has to be generated by the brain's corpus collosum, which acts as the 'meeting place' of these three planes. It is a 'junction' (not the unity) in the brain where such 'meetings' takes place. In relation to artscience, the question becomes what particular concepts are they expressing? Artscience suggests that science forms the 'non' of art's outside. Which is to say in relation to the Anthropocene, what concepts of the Anthropocene's 'problematic' are certain artworks questioning to make what seems 'invisible' phenomenon like climate change, visible for us to open up new realization that generates new sensibilities and changes in acting *with* and *in* the world. The 'concepts' they articulate are embodied in the art-sci-works themselves that enable change in the meaning of the world. Artscience performative forceworks are 'living thought' with 'monumental' implications. Jonathan Fardy (2019), for example, attempts to show how artscience works provide insight into issues of reflection, history and perception. They become points of departure for philosophy itself. Fardy draws on Amish Kapoor (sculpture), Dan Flavin (neon installations) and James Turrell (perception of light via installation) to make his case that these artists 'make us think'; they confront us from the 'outside', questioning the doxa of perception, history, and representation.

Such an orientation for art education becomes crucial for the phase change that the Earth is undergoing. The coming together of art and science can be further understood as the coming together of assemblages and apparatus; that is, the left and right brain hemispheres, a discussion that has been neglected in art education discourse for some period now but was widely discussed in the early 80s where

the 'right hemisphere' was touted as the seat of artistic expression. It is clear today that there is no separate divide between the left and right hemispheres; the brain's plasticity, as theorized by philosophers and neurologists alike, presents new challenges, especially to hardcore psychoanalysts. Catherine Malabou (2008) idea of 'destructive plasticity' or 'explosive plasticity' raises questions concerning extreme cases of memory loss, such as Alzheimer, but also a turn away from forms of neuro-normativity. 'Destructive plasticity' presents us with the uncomfortable position that there is no 'normal' per se; each of us copes with our own stresses and traumatizations, metastates being moments of stability that are sure to change. The left and right hemispheres working in various states of productive entangled processes arrive as the collapse of science-art and art-science as *techné*. Modulation replaces the hierarchy of hylomorphism; that is, as some sort of idealized 'method' that the artist, researcher, imposes on the data (material) and the 'conceptual-mould' that in-forms matter. The 'mould,' considered as the technological (scientific) 'apparatus', mediates the idea and the product – the result of a relational process. The 'mould', as modulation, channels the dynamic cosmic physical forces at 'work'. These are the actualized operations or processes of individuation. Individuation, more commonly referred to as the reality of 'becoming', spacetime movement that is always transindividuated within a particular ecology.

What if the teacher is simply considered a 'mould' in the process of art/design education as was bluntly stated by that outworn adage above? This seems to be rather harsh and impersonal claim. Is the teacher a mere 'technician' aiding a student's process as an artwork unfolds? It raises the uncomfortable issues surrounding teaching machines or artificial intelligence somehow channeling energy, simply there to guide and prompt and adjust as the process of exploration and research unfolds in 'real time'. Enthusiasm as the infectious and contagious spread of affect to students is mimed (simulated) by all sorts of prompts that are already quite sophisticated in video games and media platforms such as Facebook and Instagram. I am reminded of James Elkins (2001) *Why Art Cannot be Taught* to vivify just what is the place of the art teacher? If 'art' cannot be taught, what can the teacher do? Elkins maps out the options that amount to the teacher being a catalyst to encourage students to explore unknowns. For Deleuze (2003), learning is an apprenticeship and an encounter with the world. The teacher is one who emits heterogeneous signs and poses problems. Art and its education are always taught as a question. To break free of vision as representation, a position which simply amounts to the acquisition of knowledge (i.e., 'a brick?'), is not an easy task, as art is 'thought without image' (i.e., non-brick, or 'What's a brick?'). Creativity appears contingent, accidental, experimental and unexpected.

The paradox that art is non-representational, having no set method, and that learning, as Deleuze informs us, is quite contrary to the individualism of expression that is celebrated, presents the difficulty of all art pedagogy. Learning is, rather, a depersonalization, a 'break' with oneself. Finding 'voice' is always going outside oneself, breaking constantly with metastability. The artist's journey is always one long series of 'breaks'. In this sense, both learning and teaching of art is a mania, a mania that lies at the edge of chaos, a dangerous edge that can fall into religious transcendent fervour (divine madness, uncontrollable love) or secular debasement (morbidty and death). This is wonderfully spoofed in the film *Art School Confidential* (2006), directed by Terry Zwigott and written by Daniel Clowes. The film juxtaposes representational (pedestrian) art with its unknown and unstated 'other' to present the edge of their meeting as one of irony and absurdity, as well as love and cruelty. The process of creation "implies a sort of groping experimentation and its layout resorts to measures that are not very respectable, rational, or reasonable. These measures belong to the order of dreams, of pathological processes, esoteric experiences, drunkenness, and excess" (Deleuze and Guattari, 1994, p. 41). In short, the creative process is a difficult and somewhat dangerous journey. In public schools, art schools and fine art departments, this 'other' of creativity is tempered and suppressed by curricular objectives, grading, utilitarian design applications and degree achieving goals for employment in the arts industries.

All education, in this sense, should be about attending to singularities conditioned by the contexts they unfold in; singularity referring to critical turning points when the system (student) changes qualitatively. A cosmic art pedagogy for the Anthropocene suggests coping with change that will be dramatic and worrying as an instability of the world on a global scale is visibly happening with increased displaced migrants, traumatic climatic events, initiatives of decolonialization by indigenous initiatives, and a general disposition towards the intolerance of democratic institutions within global capitalist economies where inequalities are so blatantly obvious. These are the problems of the Anthropocene. But 'learning' in the Anthropocene has high stakes. In relation to what has been said about learning and teaching, this would demand transformations of our bodies and language to meet the demands of the problems. To interpret the 'signs' of the Anthropocene, which is the task of the cosmic artisan, is to pay attention to the signs that indicate transformations within the system. The cosmic-eco-artisan tries to identify the condition of the 'structure' of the Anthropocene, the conditions of its genesis to cope with the transformations of the phase shift that is taking place, its sensitive points so that it will be transformed ... to what can only be projected.

Can anything be done ... or taught?

I end the essay with several extended examples of cosmic-eco-artisan projects which explore the Anthropocene problematic, developing art-science apparatuses whereby their forcework can affect a renewed perception of the world. They offer an invitation to participate and intra-act with the configured art apparatus invented with the possibility of being 'changed' by the encountered event. In this sense, they are exemplars of *Lassen* technologies. Cosmic-eco-artisans working with the 'elements' of the Earth (ice, air, fire, soil) require an intimate grasp of the performativity of matter within cultural contexts for their affective agency. Ice, for instance, is a medium/material explored by a handful of artists to draw direct attention to the global melt and the human codependence with the earth's frozen matter: Jacqui Jones's *Melt* (2012), Mark Coreth's *Ice Bear Project* (2009-10), Nele Azevedo's series of *Melting Men* (2005-ongoing), and Olafur Eliasson's *Your Waste of Time* (2006, 2013) are prominent examples. Simone Hancox (2013) addresses the way Eliasson's *Your Waste of Time* enables a defamiliarization to take place between glacial ice and visitors entering a refrigerated room of -6° C where an intra-action takes place between the thermal energy of humans (37° C) and the room temperature which 'sustains' these glacial ice boulders in 'suspended animation', preserving their agential properties so they do not melt. Does Eliasson's apparatus do its affective forcework with and to visitors that enter the room? The question raised here is: "Where is the 'cut' of this installation-assemblage-apparatus? Does it signal towards the global crisis?" The exact meaning/intent of its performativity is left somewhat open, raising paradoxical issues: the costs of sustaining six tons of Icelandic glacial ice; the energy expenditures involved via the refrigerating units; the time of year they are displayed; the ability to control the conditions of the glacial ice, and the power to move it from its location of Jökulsárlón to travel approximately 2,250 km to a Berlin gallery. Is this last condition just another sign of dominance that 'clashes' with the agential force of nonhuman matter like ice? There are no clear answers to such paradoxes – pointing to a deceptive nihilism that only points to further questions: "What is it for? Of what use is it?"

A more impressive performative project is staged by Danish artist Tue Greenfort (2007) called *Diffuse Einträge* [Diffuse Entries], a sculpture installation for SkulpturProjekte Münster 07 edition. The 'sculpture' consisted of a high-pressure liquid manure spreader that spewed water taken from Lake Aa, an artificial recreational reservoir lake southwest of the center of Münster that is fed by the river Aa. The sculpture was, in effect, a mobile pressurized fountain. The lake is overgrown with blue-green algae making it a hazard to swim in. In short, it is contaminated, not only to humans but to birds and fish. The cyanobacteria that proliferate the lake is toxic. This is par-

tly due to processes of eutrophication, where the intensively farmed Münsterland region (one where cows and pig farms are in abundance) are made toxic by high levels of phosphates entering the river from fertilizers and liquid manure that flow into the lake. The meat industry in the region is bolstered by EU subsidies and it has a powerful lobby and influence on the municipality. To 'protect' the meat industry and the many specialty products manufactured in the farmlands of Westphalia, a cosmetic solution was found to reduce the level of phosphates in the lake by adding Iron (III)-Chloride into the water. This was the first time this chemical (usually used in water system cleaning plants) was used in open waters – both in the river Aa and the lake to reduce the smell and the algae. The chemical itself is hazardous to health. To keep EU subsidies, the source of the pollution was not mentioned but covered over, caused by "diffused entries" as Greenfort found out from the researcher who had developed the chemical solution.

Greenfort's 'sculpture' intensifies the smell of manure by adding Iron (III)-Chloride into the water as it forcefully pumps its water out, attempting to disrupt and bring attention to the irony of the cosmetic solution. Unlike the usual gesture to buy and install sculpture pieces from this seventh edition of the project, Greenfort's sculpture is an anti-form. Its affects are offensive to the city's decision. Greenfort intervenes in the romanticized landscape of peace and relaxation that this recreational lake promotes by causing an affront to the visitors that come to the lake, the affect created by the smell brings together the ethico-political issues between state, municipality, and the meat industrial lobby. Greenfort exposes the invisibility of the 'causes' of the established aesthetic that was to preserve Lake Aa as recreational area by directly intervening in the *agencement* via his sculptural apparatus. The 'diffuse entries' are concretized and exposed. The more difficult question of such an ecosophical intervention into the political, economic and aesthetic dimensions is whether the actualized intervention would change the established state of affairs, or does it become yet another interesting foray into nihilism? A so what?

Yet another rather interesting take on the cosmic eco-artisan is presented by Swiss artist Ursula Biemann's animist cosmological forays through post-cinematic documentary essays: *Subatlantic* (2015, 11 minutes,) and *Acoustic Oceans* (2018, 18 minutes). They are exemplary as fictions that speculate on new forms of life. The first is set in the remote area of the Shetland Islands, Greenland's Disco Bay and on a tiny Caribbean Island. In the second fictionalized documentary, the acoustic ecology of the oceans is examined by an 'aquanaut', a she-scientist (Sofia Jannot, an eco-activist of the Sámi) on the Lofoten Islands in Northern Norway. The 'aquanaut' occupies the place of the event, a disposition or 'posture' (not a position) in François

Laruelle's (2013) terms. It is a non-relational position, neither internal nor external but occupying a space of indeterminacy that then 'fictionalizes' the findings. Here, sound becomes the primal element of exploration, with its different wave lengths. In ocean channels, whales emit low level wave lengths, but each species has a different range and repertoire. The technological apparatuses-media-assemblages are especially helpful when it comes to interspecies communication through sound. Recording and emitting of sound by all possible sonic instruments are (literally) in play. Animistic cosmologies, referred often to as the 'new animism', call on indigenous knowledge as generationally passed on through oral narrative traditions to offer competing ontologies for ways to relate to the land and sea that set them apart from settler colonialism (Harvey, 2005, 2015). They have become cosmic in their design constructions by artists attempting to breach the divide between the human and nonhuman using inhuman (AI) *techné* (jagodzinski, 2019b). The seafloor especially is an important communication space for many creatures where new channels of commutation are discovered, given the varying wave lengths of communication that are emitted by whales over vast distances. Such communicative ventures, as exemplified by the above initiatives, increase potential, and are 'negentropic' in their effects within ecological systems, to support Bernard Stiegler's (2018) thesis of ways to counter the 'toxicity' of the current 'sixth extinction', the 'biological annihilation' of life pervaded by entropic waste and decay (Ceballos et al., 2017).

These *Lassen*-types of *techné* increase communication between entities rather than closing them down. Anthropomorphic fictions with animals increase energy exchanges to begin an attunement with and to other ecologies. What these projects exemplify is mediation which takes place between the human and non-human via the inhuman invented AI technologies that become enabling mediating apparatuses, a whole host of new macro and micro lenses and listening devices invented to better grasp the *Umwelt* specificity of each 'creature'. In doing so, the exchanges between the human and non-human change. An extraordinary illustration of this is captured by a documentary, *My Octopus Teacher* (2020) directed by Pippa Ehrlich and James Reed. It charts Craig Foster's relationship with a common octopus in the kelp forests of False Bay, South Africa. The contingencies of an event can occur when an anomalous occurrence happens in such exchanges. We have only to think of the compassion shown by dolphins saving humans from drowning and shark attacks, and vice versa, humans helping to free stranded dolphins or whales. Yet such exchanges may not be anomalous; they may not result in an encounter of profound transformation. This documentary, however, is a confirmation of what Deleuze and Guattari (1987) identify as 'becoming animal' where a transformative exchange happens on both sides

of the relationship during these contiguous moments. Such a phenomenon is quite apart and distinct from the many references to Deleuze in posthumanist research that call on *response-ability* (as famously signalled by Donna Haraway) where the more-than-human is embraced by an *additive* logic: the human plus everything else where language, consciousness and meaning remain key intact distinctions. The entangled relationality remains asymmetrical. In the above documentary, something 'anomalous' does happen in the exchange, a contingent and rare event.

An ecology of (Anthropocene) practices

The last point to be made is to say that each of the above examples presented, a sampling of many projects cosmic eco-artisans are engaged in where arts science comes together, are singular in their pedagogies; this is to say there is no method per se, but an invention of an apparatus that channels cosmic-earth forces to vivify and invite change – without any guarantees. Simondon's paradigmatic process surrounding the 'brick' still has pedagogical merit. A 'brick' is not a 'brick' until it is made and then named. New 'bricks' need to emerge that address the Anthropocene. Art pedagogy has to concern itself with the 'problematic' of the Anthropocene. Such a 'problematic' always presents boundaries that must be overcome through experimentation so that *thought* is provoked that dwells outside its parameters. Here, Isabelle Stengers (2005) provides insight as she has embraced both Simondon and Deleuze in her conceptualization of an "ecology of practices". An "ecology of practices" as a *tool* captures such a challenge for art education. As a "tool" an "ecology of practices" are "passed from hand to hand" but each instance of such passage is a "particular one". What a tool means only materializes when it is applied and then gives the "situation the power to make us think" (p. 185). The 'situation' here is a 'virtual one' in Deleuze's terms of a potential that the tool can then actualize. An 'ecology of practices' means a particular achievement that brings divergent series together (actualization) without knowing in advance just how and which series will come to matter to form the result. For art education, the most difficult aspect of such a process is that one never quite knows just what 'force' or idea enables communication between heterogeneous series, which then result in the production of the 'new'. Which tool ends up as a catalyst cannot be seen in advance. It is all a retrospective process, which throws any predetermined evaluation of art – rampant when it comes to art standards in schools – out the window. Its performative affects/effects are only known after, when it 'stands alone'. Deleuze and Guattari (1987) refer this as

art's 'monumentalism', which has nothing to do with monuments to remember the past, rather, it is closer to artdesign being a portal of deterritorialization that 'works' on us as viewers and participants by releasing its affects (percepts and affects, its sensibilities) to open another as yet unthought world. This is a cosmological mission "to make perceptible the imperceptible forces that populate the world, affect us and make us become" (p. 182).

For Stengers (2015), the Anthropocene is characterized as the "intrusion of Gaia", which presents an "indifferent mother" with no explanation or reason for the survival or extinction when it comes to our species. This means that a 'response' is necessary even when there is no adequate response or even a sufficient one to such a 'problematic'. While there is no adequate response to the problematic of the Anthropocene, every response that is made changes the conditions for the future struggle for change. While the problematic field does not go away, it transforms and generates new conditions for learning and responding. There are no prepared answers, only local questions and provisional answers that *may* change possibilities for future response. In this sense, the artwork of Tue Greenfort is exemplary for its response to the Anthropocene problematic with the specificity of location and its conditions raising the questions of concern. As Stengers (2015) writes: such responses "will always be local responses, not in the sense that local means 'small' but in the sense that it is opposed to 'general' or 'consensual'" (p. 131). Art education for the Anthropocene is challenged by such a proposition: given a local situation, what can emerge that highlights the problematic?

The Anthropocene problematic demands an 'aisth sis' response that does away with the bifurcation of nature and culture. Natureculture, as some theorists (Haraway, 2003) have characterized it, means that art education turns towards an artscience|scienceart continuum that generates various topological fractal spacetime milieus; the former (artscience) is more speculative, forwarding the fictions of the imagination that open up 'impossible worlds' 'grounded' in the now and here of 'culture', such as bioart. The latter (scienceart) relies on the designs of nature to propel the imagination to worlds, as explored by biomimesis, where the stress is on the design's engineering side. Ultimately, the attempt is to influence the structures of feeling that pervade the Earth's phase change through multiple fabulated fictions, each specific to an ecological location. The 'research' involved is specific to the problematic Idea and its breakdown or breakthrough in the process of its unfoldment. It presents only one event on the journey of many to come. Cosmic art pedagogy in this sense is always contextual, idiosyncratic, singular, and carefully staged with

rigor. Of import is its performative force as channelled by the apparatus invented, and in its potential to affect those who engage with it.

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