The Ecology of Form

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Two waves impel this essay: the ecocritical turn and formalist theory. What happens when these waves meet, when we read form *ecologically*? In what follows, I engage form as an inherent feature of the way both natural and social systems interact, rather than a property imposed on the world by human perception or language. That is, I recognize form as process, and generate an ecopoetic theory of relational form.

This requires a shift, because we usually think of forms as stable properties of objects, rather than shifting systems of relation. Sandra MacPherson observes the former in the shared way “an artist, an engineer, a biologist, a linguist, a philosopher” use the notion of form: all see “form as nothing more – and nothing less – than the shape matter (whether a poem or a tree) takes.”[[1]](#footnote-1) This notion of form as shape, as the stable structural features of specific things, works well when we consider objects in their static totality, but it stumbles when we consider the dynamic processes through which they unfold, when we ask: how does a form *take form*?

In their shapely materialism, modern formalisms bear the stamp of an old encounter: the conceptual impact of ancient technologies of material fabrication, chiefly, the use of physical molds to cast objects (Figure 1). A mold is a container with a hollow interior into which someone pours a liquescent material that takes the mold’s shape and then hardens into an object. A reusable mold can cast many copies of that object, whether ancient coins, or later, printing type. As a container form, the matrix presents the clearest instance of form considered as a *shape*, instantiated by a specific *material object*, with an effect *dependent* on its material properties, and *designed* for a *specific* *use*.

As a technology, the mold produced a new way to make things, but alongside other manufacturing technologies, it also fabricated a powerful way to think about what things are. It clarifies, for instance, the material imagination inherent in Aristotle’s hylomorphic treatment of form (*μορφή* or *morphé* in Ancient Greek, later translated as *forma* in Latin), with lasting impact on Western philosophy.[[2]](#footnote-2) Aristotle’s consistent jumping off point is the analogy between natural forms (especially organisms) and human artifacts. In either case, form defines what is essential to a given class of things. In the *Metaphysics*, he elaborates a point made in the *Physics*: the construction of any artifact shows that form is what turns brute matter into a thing. For this reason, it is closely identified with species; he uses *morphé* (form as shape) almost interchangeably with *eidos* (form as essence or kind).Manufacture modeled how form transcends individual objects in a limited sense; it is present in the mind of the craftsman before it is instilled in the object, and the same holds true for life forms, which reproduce by impressing their form on their offspring. In either case, shape is essence, and form is not so much created as *passed along*, immanently manifest in the way it continues to mold new things.[[3]](#footnote-3)

The fusion of shape and kind in Aristotle’s account generated lasting problems for Western philosophy and aesthetic theory (some of which I review later in this essay). And it explains certain habits in the way we think about forms today: our sense that they are the shape of some content, and that they illustrate an important connection between social forms (artifacts) and natural forms (like organisms).

Turning the page on Aristotelian formalism, I begin by noting that the mold cannot contain the pressures of its own formal abstraction. For one, the mold does not mark the relation between a single shape and its individual content, but a multiplicity of relations. A reusable mold shapes multiple objects, not just one, but more important is the fact that for any mold to work you have to have at least three different materials – the stuff that constitutes the mold, and at least two contents: the stuff that the object will be made from, and the emptying content, usually ambient air, which fills the mold before and after its shapeable material is formed and then cast out. The function of the mold is dependent on the material properties of its content and its environment as much as the mold itself; you need a material that can be poured inside and that will then harden, and must create conditions (usually by heating and cooling) that will support that action. Finally, a mold is only relatively stable – it wears out with use – and its iterated contents display variation, not to mention, the relative skill of the its operator.

Rather than a discrete combination of shape and substance, form is a constellation of things and repeated actions. More precisely, any form is a sequence of events that happen at the interface between multiple things – the mold and the behavior of its alternating contents, the air and its atmospheric pressure, etc. The simple distinction between *form* and *content* does not adequately capture the dynamic and expanded nature of these relations. In place of moldy formalism, and instead of container form, we need a relational formalism, a theory of *re*form. To put this differently, form is *ecological*; it works through wider networks of relation, and of the material, energetic, and social interactions that give it life.

In the essay that follows, I derive this relational account of form from the philosophy of Charles Darwin, and his lifelong attempt to understand the dynamic processes through which ecologies develop and sustain forms. In order to extend the social and literary implications of this account, I then turn to the “ecological vision” of society produced by Edouard Glissant’s poetics of relation.[[4]](#footnote-4) Read in light of Glissant, the ecology of form produces a new way of reading social patterns in terms of their relation and action in time. I conclude by demonstrating what this might look like in practice, drawing on the materialist shift in critical race studies to explore ecologies of race and migration in Matthew Arnold’s poem “Dover Beach” and Helen Oyeyemi’s Gothic novel, *White is for Witching*.

This itinerary, which traces a theory of form from the history and philosophy of science, to postcolonial and critical race theory, to poetics and literary history, makes an argument for form as a promiscuous feature of the world, and for formal analysis as a mode of inquiry that destabilizes disciplinary distinctions. Forms, as both natural and social relations, cut across disciplinary divisions of knowledge and require an interdisciplinary approach.[[5]](#footnote-5) In resisting the distinction between natural and social forms, the ecology of form embraces the possibility that our habitual ways of addressing each other and the world, our languages and modes of representation, open up rather than close off our engagement with nature.

1. From organism to ecology

Darwin studied ecologies as the complex networks of growth and cooperation, competition and death, through which living and nonliving agents interact. And he understood, as recent theorists of the climate crisis have been at pains to explain, that these networks necessarily include humans and their artifacts as important components.[[6]](#footnote-6) Darwin’s effort to gauge the radical implications of reading humanity’s history into the natural world had profound consequences. In reviving Darwin as a foundational process philosopher and ecotheorist, alongside recent work by Elizabeth Grosz and Eugenia Brinkema, I seek to turn our attention back to the complexity of his ecological thought, and the central role form played in Darwin’s evolving account of the living world.[[7]](#footnote-7)

Darwin’s philosophy continues to resonate because it shifts from reading form as inherent plan or intricate design, to reading form for the contingent history of open systems, and from seeing form as a property of individual organisms, to recognizing it as non-determinative relation between multiple things in process, including human societies. *On the Origin of Species* is still celebrated for the way it unsettles fixed and essential categories, especially “species,” “sex,” “race,” and the “conditions of life” (or environment). But this was part of a more general revaluation of “form” as an object of analysis, whether recognized in natural forms like organisms and their structures, or in cultural forms like language.

Darwin remains one of our most important theorists of form because he abandoned the longstanding relation, established by Aristotle, between form and kind, between *morphé* and *eidos*, as well as the relatively closed notion of inbuilt organic form furnished by eighteenth-century theorists. His early publications, which assume a fixed natural order, follow Aristotle in treating physical form as equivalent to species, a marker that defines and separates one true species from another.[[8]](#footnote-8) But as he laboriously worked his way through systems of classification, beginning with ten-year study of barnacles, Darwin’s language of form evolves into a critical reading of natural structures. He soon abandoned his faith in “constant form,” exploring form as a critical challenge to species stability.[[9]](#footnote-9)

The extraordinary success of Darwin’s theory of natural selection has overshadowed his more audacious lifelong project: to explain how, in the absence of a design, and in the face of constant flux, natural patterns sustain themselves. Form, as evidence of histories of interaction, cooperation, and competition, provided the thread of connection, the clue. *On the Origin of Species* takes the variability of form as key evidence of the continuous relation between species, individual, and environment. Darwin adapted form to study the relation between widely different forms of life, and so, gave an ecological reading of form and its bearing for the study of humanity and social structures. Darwin’s efforts to read such forms not as carefully engineered correspondences between organism and the world, but as a network of uncertain adaptations, initiated a more important transformation, exploring form as a new way to read ecologies: “[T]he structure of every organic being is related, in the most essential yet often hidden manner, to that of all other organic beings” as well as the “elements” of their environment; whether recognized in “the structure of the teeth and talons of the tiger” or “in the beautifully plumed seed of the dandelion, and in the flattened and fringed legs of the water-beetle.”[[10]](#footnote-10) Living forms record longer, chance-ridden histories of interaction between being and environment, of content and extant. Driven by action and reaction, competition and cooperation, violence and care, such structures testify to an ecology of forms.

Darwin sets out his most elaborate account of the ecology of form in the final phase of his thought, as he turned attention to its implications for the seeming integrity of organic bodies and the status of social forms. In *Variation Under Domestication* (1868), Darwin confronted the problem of inheritance, and the question of how organisms maintain their physical integrity despite both the influence of their environment, with traits inherited from physically different lineages. How were all of these influences knit together? Darwin’s proposed solution, which he termed “pangenesis,” was a radical speculative leap. Through pangenesis, Darwin theorized, all the minute parts of the body reproduce themselves independently through interaction with the new conditions they encounter. Theorized as the transmission of various particles of “formative matter,” which grew and reproduced themselves in the environment of the body, pangenesis reads the ecology of form into the body itself, rearticulating the organism as an ecology of semi-autonomous, circulating forms. Hylomorphism resurfaces in “formative matter,” but with a twist: the form that is transmitted is never quite the same, its *persistence* as a regulative principle disappears. Interacting with the world, the relations of formative matter change, and sometimes fail entirely. The mold breaks:

Inheritance must be looked at as merely a form of growth .... Each animal and plant may be compared to a bed of mould full of seeds, most of which soon germinate, some lie for a period dormant, whilst others perish. ... Each living creature must be looked at as ... a host of self-propagating organisms.[[11]](#footnote-11)

This vision is radical, and unsettling. The organism’s perfect integration of part and whole is exchanged for a messier, wasteful ecology, a “bed of mould” or soil, in which some things survive, and some don’t. Inheritance is reimagined as an insistently ecological “form of growth,” constantly interacting, constantly in flux. In trading mold for mould, Darwin asks us to imagine we are simply a portion of our environment, no more organized, and no more handsome, than any seedy bit of ground.

Darwin spent the rest of his career trying to work through the implications of this radically relational ecology, with its thorough demolition of organic form and progressive development, including it in later editions of the *Origin*. In 1872, he added an extended comment on the nature of organic form:

[W]ith organic beings we should bear in mind that the form of each depends on an infinitude of complex relations … and this depends on the surrounding physical conditions, and in a still higher degree on the surrounding organisms with which each being has come into competition,—and lastly, on inheritance (in itself a fluctuating element) from innumerable progenitors, *all of which have had their forms determined through equally complex relations*.[[12]](#footnote-12)

All seemingly organic beings, in this account, are buzzing congeries of forms, of an intricate series of relations, internal, external, to other beings and to the wider world, in essence, a sum of accidents.[[13]](#footnote-13) To read them is to read for that wider set of relations, to interpret the contexts that are pertinent, and their connection to other forms, within and beyond their ancestral line.

The *Origin* dodges the implications of this new ontology for human societies and contemporary debates over the biological status of human races. His final treatment of this question, *The Descent of Man* (1871), remains his most controversial book. Periodically marked by racist, misogynist, and imperialist judgments, it remains a flashpoint for critiques of Darwin, the toxic possibilities of his thought, and his place in the genealogy of nineteenth- and twentieth-century racial science and genocide. Sylvia Wynter’s analysis of the central role race plays in “biocentric” modernity is a major example. Over more than a dozen extended essays and interviews she engages extensively with Darwin, Darwinism, and neo-Darwinian paradigms, on at least three explicit levels: taking Darwin as a consequential theorist of the biological nature of humanity; as the progenitor of Darwinist theories of race and gender; and as a philosophical model for imagining new ways to read human history and its future. The first two center on the “contradiction at the heart of the Darwinian Revolution ... on the one hand, the continued dazzling successes of the biological sciences and on the other ... the obsessive ethno-biological beliefs in the genetic inferiority of nonwhite natives.”[[14]](#footnote-14) From a wider perspective, Wynter’s consistent adoption of evolutionary theories of anthropology and psychology, as well as complexity theory, mark her own contributions as a theorist of human evolution -- very much on Darwin’s model.[[15]](#footnote-15)

To these explicit engagements with Darwin I would add a fourth, subterranean, and perhaps more consequential relation to modern theory: Darwin’s lasting influence as a critical process philosopher. *The Descent of Man* marked Darwin’s most sustained attempt to give human evolution, aesthetics, and cultural forms a thoroughly ecological reading. This extended and consequential reading of culture as changeful and erratic develops, in Wynter’s terms, a consequential interpretation of the “human as praxis.”[[16]](#footnote-16)

Darwin’s treatment of race is especially critical. He opens his chapter “On the Races of Man” by immediately translating race into the language of form:

It is not my intention here to describe the several so-called races of men; but to inquire what is the value of the differences between them under a classificatory point of view, and how they have originated. In determining whether two or more allied forms ought to be ranked as species or varieties, naturalists are practically guided by the following considerations; namely, the amount of difference between them, and whether such differences relate to few or many points of structure, and whether they are of physiological importance; but more especially whether they are constant.[[17]](#footnote-17)

The pivot from *races* to *forms* here allows Darwin to reinterpret races as loosely related collections of features, or component forms, rather than unified systems of distinction. Carefully sifting the handful of superficial traits considered diagnostic by contemporary racial taxonomists, and the many more traits that do not in fact vary, Darwin ultimately concludes that such difference are, in fact, “few,” of little “physiological importance,” and far from “constant.” In this way, Darwin used the ecology of form to explain why race was neither an essential feature of human populations, nor a particularly useful biological category. As Kwame Appiah explains, Darwin’s account precipitated a radical shift away from theories of “racial essence,” and so, made a critical contribution to the dismantling of racist science.[[18]](#footnote-18)

1. Racial ecologies

Darwin was not the first modern theorist to think about form in terms of living processes and environmental engagement, and a review of those alternative accounts, and their contributions to racist science, can set the possibilities of his ecological thought into relief. The eighteenth century hosted raging debates over the nature of organic form, the source of its order, and its relation to environment. Preformation held that all future biological forms are prepackaged within the ancestral line, and that biological growth is simply the expansion of this engrained design. Epigenesis, by contrast, followed Aristotle in arguing that generation is a process through which organic form is impressed on matter by parents (hence, *epi-*genesis, generation *upon* or *from without* something).[[19]](#footnote-19) Though they disagreed on the precise mechanism, enlightenment epigenesists generally read organic form as the expression of a power that molds creatures from within, rather than impressed structure. George-Louis Leclerc, Comte de Buffon, for example, argued that parents impart a *moule intérieur* or “internal mold” to their offspring, describing it as a force, “analogous” to gravity, that acted continuously on organic structures.[[20]](#footnote-20) The interior mold explained how, even as individual members of a species showed a multitude of differences, the essential nature of the species would be preserved over time.[[21]](#footnote-21) Immanuel Kant closely followed Buffon, explaining the formal stability of species as a regulative organic force or “original predisposition” imparted in the offspring.[[22]](#footnote-22) Kant organized his account of human races around this principle of inbuilt formal regulation, arguing that distinctions between different human populations did not reflect the unmediated influence of environment, so much as the ability of different conditions to draw out the “original predispositions” of the human species, reflecting the “solicitude of nature to equip her creatures through hidden inner measures for all possible future circumstances.”[[23]](#footnote-23) This teleological analysis secured a close identification between environment and the stability of human races; Kant speculated that those same predispositions ensure that racial difference becomes fixed: “once a race has established itself as the result of a long residency of its ancestral people ... no further climatic influences could cause it to change” (48).

Eighteenth-century epigenetics translated Aristotelian hylomorphism as a regulative force that ensures stability despite degrees of change. This interpretation was widely influential in later accounts, persisting in morphological studies which sought unifying models of development behind the variety of species and their forms. So, in Goethe’s *Metamorphosis of Plants* (1790) – which had an extraordinary influence on German idealism, especially by way of Hegelian philosophy – organic development is explained as the progressive unfolding of a central idea or archetype.[[24]](#footnote-24) In the process by which the seed develops into roots, stems, and leaves, Goethe describes a stadial development in which even apparently “retrogressive” steps prepare the *Aufhebung* of a transcendent new transformation, especially evident in the formation of the flower and fruit.[[25]](#footnote-25) Importantly, Goethe sets aside the “incidental” influence of other creatures in the environment, emphasizing instead that the strictly material elements of the environment, like air or water, draw out the archetypal form.[[26]](#footnote-26) In Goethe’s morphology, Aristotle’s epigenesis is effectively divided into two collaborative processes, the inbuilt formal drive of the organism and its providential interaction with its surround, each revealed continuously in rhythms of growth, interaction, and transformation -- cycles of thesis, antithesis, and synthesis adopted by Hegel’s dialectic.[[27]](#footnote-27)

The formal stabilization of organic vitalism played a consequential role in subsequent arguments over human races and their biological distinction, furnishing a mechanism for the persistence of essential racial difference despite evidence of relation and change over time. In *Die Natürliche Schöpfungsgeschichte* (*The History of Creation*), Ernst Haeckel drew a tree that progressively ranked dozens of putative human races.[[28]](#footnote-28) Such trees demonstrated, according to Haeckel, the general applicability of Goethe’s approach, in which the naturalist looks beneath the diversity of extant types, in search of the “essential form” (*einfache Grundform*) from which different groups develop.[[29]](#footnote-29)

If, as Zakiyyah Iman Jackson explains, Haeckel demonstrates the organization of contemporary science as the “pursuit of an observable and comparative basis of racial taxonomy,” he also illustrates how organic conceptions of racial integrity shaped the new science of ecology.[[30]](#footnote-30) Ernst Haeckel coined the term “ecology” in 1866, defining it as “the whole science of the relations of the organism to the environment including, in the broad sense, all the ‘conditions of existence.’”[[31]](#footnote-31) In “ecology,” Haeckel drew specific attention to the root term, *oikos*, which he defined as “household or housekeeping, living relations.”[[32]](#footnote-32) In doing so, Haeckel aligned ecological homemaking with his analysis of the progressive organic development of both species and human races. A subsequent generation of ecologists, notably Frederic Clements and John Phillips, translated Haeckel’s home-making into invasive homesteading. Working in settler colonial spaces (the American Southwest and South Africa) they articulated this rapacious “ecesis” as a process through which any entity – from a species to a society – made its “special destiny” manifest, treating environments and Indigenous peoples as instruments of that fulfilment.[[33]](#footnote-33)

There is a clear racial and imperial inflection to this ecological thought, imagined through the lens of a white colonizing subject whose environment is produced through genocide -- the “possessive investment” of what Curtis Marez terms “white ecology.”[[34]](#footnote-34) Ecocriticism is already beginning to take this history into account, exploring the “slow violence” of environmental racism, studying Indigenous and non-Western relations to land management, and tracing the conformation of “racial identities and ecological space and place” in what Leilani Nishime and Kim. D. Hester Williams term “racial ecologies.” [[35]](#footnote-35) White ecology threads through strands of ecological thought that define the environment in terms of its utility to a centered subject, whether in the intimate relation Jacob von Uexküll proposed between the *aufbau* (or “essential plan”) of an organism and its surroundings, or the interpretation of environment in terms of Gibsonian “affordance.”[[36]](#footnote-36) Even as they deploy the vocabulary of ecology, such accounts forestall the possibility of a truly “relational ecology,” as Stephen Nathan Haymes explains.[[37]](#footnote-37) As a recent example, white ecology persists (by way of Gibson) in the opening example of Jonathan Kramnick’s *Paper Minds: Literature and the Ecology of Consciousness* (2018), which locates, within the house-making scene of *Robinson Crusoe*, a homely articulation of “perceptual ecology” (1-3) in which the colonial environment is drawn comfortingly into Crusoe’s domestic reach.[[38]](#footnote-38) But how does Man Friday fit into Crusoe’s ecesis? In asking, I underline how the domesticating impulse of settler colonialism continues to shape the ecological imagination.

How might Darwin contribute to what Achille Mbembe and others have called the “decolonization of knowledge,” especially, the decolonization of ecological thought?[[39]](#footnote-39) Darwin’s theories, like his science, were powered by environmental devastation and the acquisitive regimes of imperial collection.[[40]](#footnote-40) Any attempt to revive his ecology as a way to think of social power and human violence in non-determinist terms must confront this history. The continuing impacts of social Darwinism, racist science, and eugenics leave much work to do in rescuing Darwin’s concept of ecology from the racist and imperialist interpreters who followed, especially if it is to be activated as a resource for social thought.

3. Ecologies of relation

Yet Darwin’s philosophy continues to resonate, in part, because it fatally undermined four key elements of racist ecology: organic form, providential development, racial fixity, and environment as resource. It is time to re-wild, or better, decolonize Darwin’s ecology. Wynter was first to read Glissant’s philosophy as a response to “Darwinist discourses of ‘race.’”[[41]](#footnote-41) And Glissant continues to offer a way to read Darwin’s ecology of form against that history, a way of reading the legacies of colonial violence and discrimination critically while opening up alternative possibilities. Reciprocally, Darwin’s philosophy helps to underline the empirical commitments of the explicitly “ecological vision” of Glissant’s *Poetics of Relation* (146). Read in dialogue, Glissant’s decolonized ecology powerfully formalizes Darwin’s complex studies of inheritance, modification, and interaction as a more basic interplay of *relation* and *difference*.

In a long chapter of the *Poetics of Relation*, Glissantteases out the basic tension between dominance and cooperation in social relations, and weighs their implications in the history of languages, cultures, and land use. Poetry, he suggests, is one means by which we might cultivate this understanding and this new “aesthetics of the earth” (151). He closes its discussion with an evocative, poetic proposition, a patterned language tuned to ecology:

Les écarts sont nécessaires à la Relation, et ils en sont tributaires –

comme l’olivier de mer pour le mancenillier. (171)

(*Differences are necessary to Relation, and they are dependent on it:*

*as the sea olive to the manchineel.*)

I want to call attention to what is lost in my translation. “Les écarts” are not just differences, but also distances (“écarter” means to separate, pull apart), which allows them to function both as a sign of difference in general, but also points to the territorial differences at stake in this particular analogy. Similarly, “tributaire” in French, like its English cognate, can refer to riverine tributaries, but has roots in the Latin word for *tribute*, a territorial relation of subjection, recalling both the marine situation and colonial history. All of these semantic resonances load tension into this dialectic of reciprocity, the threat that balance will shade into domination. Elsewhere, Glissant defines relation as “The repercussions of cultures, whether in symbiosis or conflict … in domination or liberation” (131). This tension between giving-with, *donner-avec* (142) and taking into one, *com-prendre* (141), lends ecology a critical force in social analysis, accentuating the constitutive tension between cooperation and competition, between symbiosis and domination, that runs through all of Darwin’s ecological accounts.

Glissant’s relation is *ecological*, always a situation of wider interplay, of an interaction between systems of relation.[[42]](#footnote-42) This tension – geographic, political, energetic – establishes what is at stake in the ecological comparison to the sea olive (*Bontia daphnoides*) and manchineel (*Hippomane mancinella*). Both are small fruiting plants, native to the Caribbean. The former is cultivated as a decorative planting, but the latter is notoriously poisonous; it was even recorded, in a Martinican herbarium, that the one could be used to cure the other.[[43]](#footnote-43) Their poetics of relation is complicated, resonating between various perspectives, etymological and semantic, ecological and biosocial. This resonance, a reverberating repetition and relation, opens them to a wider ecology of meaning and literary reference. Glissant, with his poet’s ear, was alive to these resonances, and intensified them. These echoes invoke Glissant’s situation within creolization and Francophone *Antillanité*: the tension inherent in writing as a Martinican philosopher and poet, with the legacies of a colonial language, while invoking, via Alexandrine, its quintessentially imperial verse form, the epic. Closing his chapter, he set these lines apart with a blank line, amplifying their medial caesura and enjambment. Any form, by virtue of its repetition, its history, embeds a kind of knowledge about the world, a statement of what the pattern has been and the question of what it will be. Forms embed histories and open to futures.

4. Wave Form

The first task of ecopoetics to break out of the container form, and set aside the notion of form as something that contains something else, form as over against content. Instead, think of form as the interface or relation betweena *content* and an *extant.* To speak of form as a relation between content and extant is to emphasize the fact that form, rather than determining content, marks a productive relation, an ecological interaction between at least two things -- what Karen Barad calls their *intra-action*.[[44]](#footnote-44) This turn from materialism and inbuilt design, toward relation and interaction, distinguishes the ecology of form and recent strands of new formalism.[[45]](#footnote-45)

Art historians have long appreciated this formative interaction between content and extant, but also, the key role of repetition.[[46]](#footnote-46) Forms both repeat and change, they are never precisely the same, and they are never singular: there is no unique form. Form is produced in the iteration of relations, in eventfulness.[[47]](#footnote-47) All of those features we generally assign to forms, including their self-similarity, mobility, and capacity to produce specific modes of encounter, are actually features of collective interaction, events repeatedly produced and reproduced by the interaction of things in the world, from material substrates to natural agents to people.

To read complex ecologies of form, within Glissant’s “flood of convergences” (45), it has helped me to develop more schematic formulations. The first:

1. *Form is relation (of content and extant) plus repetition (F = R + R)*.

As a reading practice, the ecology of form continually asks two questions: *what does the form bring into relation* (what are its pertinent contents and extants)? And *what does the form repeat* (what is its history, what does it bring to the present, what does it echo or duplicate)? It is a question of the relations between the things and the world – the contents and the extants – and their place in a wider network of examples, echoes and repetitions.

How are we to read the action of that convergence, the manner in which forms engage each other? An intriguing feature of Caroline Levine’s material formalism, which this essay responds to, is its concern for how forms sometimes “collide” and at other times are “superimposed.”[[48]](#footnote-48) Imagined as physical artifacts, in the mold of Aristotle, it’s intuitive to think about how forms bang into each other, and how they might cover one another up, how they *compete* for the same space. But how do forms *reinforce* each other? How might they occupy the same space, the same impulse, without displacement? How is it that so many different forms, syntactic and social, phonemic and conceptual, can interact within a single sentence? If we think of form less as a thing than as an *interface* between a content and an extant -- as something like a wave -- another possibility rises.

The mathematical concept of wave *superposition* provides one suggestive way to think about how forms interact without displacing each other. As Karen Barad explains, “waves are not entities but disturbances extended in space,” and this is one reason that waves can combine, can add up without displacing each other.[[49]](#footnote-49) This combination can *amplify* the specific patterns in each wave, but also reduce it: out of sync waves *interfere* (Figure 2). There is no collision, no above or below in “super” position; component waves combine and interact. Superposition might more accurately be described as com*-*position: placement together, or being-with. And because waves add up, any complex wave can be broken down, analyzed into component wave forms. Such layering suggests why there is so much debate over the scale and place of form: whether it applies equally to categories like trope, or genre, or social custom; whether it is an exclusive feature of social custom and man-made artifacts, or an aspect of the wider world.

The interplay of wave forms has helped me think about the relational mode of this essay, which draws from Black and feminist science studies in aligning different theoretical perspectives, writers, and problems. Barad identifies this as a “diffractive methodology [that] is respectful of the entanglement of ideas and other materials” while Tiffany Lethabo King describes it as encounter through of “assembling, shoaling, and rubbing disparate texts against one another.”[[50]](#footnote-50) Superposition offers a different formal model for the intersectionality that Kimberlé Crenshaw Williams identifies between systems of power and discrimination, including race, gender, and class.[[51]](#footnote-51) The *composition* of waveforms at various levels of scale, and the ability of waveforms operating at different scales to interact, provides a fluid understanding of critical, social, and formal interplay.[[52]](#footnote-52)

In addition to asking, what does this form bring into relation and what does it repeat, the ecology of form asks: how do other forms amplify it? how do they interfere?

1. *Superposed forms amplify & interfere (F + F = A + I)*.

Wave forms are social, as much as physical phenomena. A classic example is given in historical data on Canadian hare and lynx populations (Figure 3). This chart is a set piece in ecology textbooks, exemplifying how oscillations in predator populations follow undulations in the prey they feed upon. Or seem to. The original version of this chart combined various incomplete series of data, including the Hudson Bay Company’s pelt records and astronomical records of sun spot cycles.[[53]](#footnote-53) A later reanalysis of the regional data showed that the cyclical periods of the two curves do not, in fact, align like this; for some periods and locations, the increases in the lynx population preceded the hare – violating the classic predator-prey relation.[[54]](#footnote-54) The likely reason is that the chart didn’t track two isolated life forms, but rather, an ecology impelled by intersecting rhythms, including Indigenous environmental management and the Hudson Bay Company’s roving trappers. All of these systems of relation amplified and interfered with the hare and lynx populations in complex ways. Such wave forms are social through and through, subsisting at the intersection of various agents and through the composition of other social forms, from the interacting populations of animals to the rhythms of global trade.

The physical sciences, and the laboratory environment, have often had pride of place in the philosophy and sociology of science, especially, in the turn to interactionist and performative accounts of science and the “dance of agencies” between scientific objects and observers.[[55]](#footnote-55) But before Niels Bohr’s physics, Darwin’s ecology explored what it meant to be a “part of that nature that we seek to understand.”[[56]](#footnote-56) In turning from shapely matter to sociable form, and from physics to ecology, I seek an ecological mode of relational analysis that can, in its focus on power, violence, and history, as well as shared agency, overcome some of the criticisms of new materialism and actor network theory.[[57]](#footnote-57) With Anna Tsing, ecology interests me because its central question, “how the varied species in a species assemblage influence each other ... is never settled: some thwart (or eat) each other; others work to make life possible; still others just happen to find themselves in the same place.”[[58]](#footnote-58) Ecology turns our attention from the immediate complication of observer and observed, to a wider play of encounters, social interactions, and relations of power, including those beyond the human. This is one way to read the formal implications of Christina Sharpe’s description of “the wake,” as “slavery’s as yet unresolved unfolding” in American life.[[59]](#footnote-59) Sharpe calls us to care for this relation between past and present, to practice a kind of “wake work” attuned to the past and its effects, to “think about the dead and our relations to them” (21). The compositionality of form can help think not only about the human lives that were absorbed by the rhythms of slavery and the capital they built, but also how the impulse of those lives, in their forced labor but also their resistances, in the multiplicity and variety of their actions, persist in the physical environment and in the life of the nations they shaped. These histories continue to unfold in the intimate relation, traced by David N. Pellow, between social inequality, environmental harm, and ecological justice.[[60]](#footnote-60)

The final question the ecology of form asks: does this form support relations of harm or care (or is it effectively indifferent)?

1. *Form affects life through harm and care (F + L = H + C).*

4. Racing “Dover Beach”

A wave is a tangible formal phenomenon that puts us in touch with wider actions. Waves are composed of many forms, including lifeforms. The shoal where a wave forms, as King explains, is an ecology.[[61]](#footnote-61) When we are lifted by a wave near the shore, we are engaged in its life, part of the relations it patterns and the power it carries.

The day after the US election in 2016, as I walked into a general education seminar, I struggled to imagine how the election of a racist and boastful sexual predator would affect my students, who had voted for the first time. The final stanza of Matthew Arnold’s poem, “Dover Beach,” kept rolling through my mind. It exhorts: “Ah, love, let us be true / To one another!”[[62]](#footnote-62) And so, I asked my students, how can we wake “Dover Beach”? How can we sit with its continuing reverberations, become attuned to what it transmits, including the histories of violence, dispossession, and the white fear that powered that wave election?

Any reading must confront the insistent connection the poem draws between the ocean and the social world. I’m swept by the briny line in which the rolling waves “Begin, and cease, and then again begin” to beat the beach, because the language so powerfully evokes the stuttering cadence of waves on sand, through a verse experience that is seen, heard, and felt. This sound is an effect of overlapping forms, functions of meter, the stress pattern, the syntax, the caesuras and punctuation, assonance and dissonance, the withdrawing hiss of “cease,” the plosive “g”s over which the line, and its waves, accelerate and break. It’s the kind of seemingly irregular rhythm or “tremulous cadence” that, as Stefan Helmreich notes, oceanographers struggled to explain before adopting wave function analysis.[[63]](#footnote-63) When we analyze a poem like this, we decompose it into the more basic formal relations – relations both internal and to the wider world – and study how these different functions combine, overlap, reverberate, reinforce, and counter poise. The layering of these relations extends across many levels; from the contours and gradations of the print on the page, to the semantic interactions of the words; from the play of light on paper, to the wash of sound that fills our ears, or the impulses that roll through our heads.

Within this experience, how might we tease out the poem’s alert historical reverberation, the way the echoing sea sings, according to the poet, of other times? A critical problem for understanding “Dover Beach” is the joinery between its two main movements. The first several sections discuss the beach at Dover and its relation to other seas; but the last section, written some time earlier, dives into martial Greek history. What connects the Dover straits, where the “moon lies fair,” and the ancient “darkling plain” on which “ignorant armies clash by night” (114)? Those final lines allude to Thucydides’ *History of the Peloponnesian War*, a favorite of Arnold’s father, who published an annotated edition, a work engrained in Matthew’s memory. In particular, the lines refer to a disastrous battle. In an attempt to surprise the Syracusan army, a Greek general ordered a nearly unprecedented night attack, and after the first wave of the assault broke against the Syracusan defenses, the Athenian army was confused and began to slaughter each other.

The defending Syracusans, Thucydides explains, shared the same basic culture: the same dialect of Greek, allied forms of worship, and (most important) the same musical key for their battle songs, the Dorian mode. The invading Greek army, by contrast, combined Ionian and Dorian soldiers, the latter drawn from tributary states, as well as mercenaries and slaves. As Arnold’s father elaborates in his introduction, musical modes (here, Dorian and Ionian), as coherent rules for the successful composition of forms, organized the fundamental relations of ancient life, above all, the collective social customs that, in his account, defined “races” in the ancient world.[[64]](#footnote-64) The night attack, which decoupled war from the diurnal cycle, had unintended effects: muting the visual tokens of alliance; tilting the aesthetic ecology of the battle field from sight to sound; magnifying, in effect, the interfering tonalities of Dorian and Ionian melodies. In the bewildering light, the invading army listened to the differing songs of their own allies and heard the clash of alien music, of interfering forms. As the poem puts it, the “alarms” were “confused.” The maddened armies of Athens smashed themselves to pieces.

What connection does the poet want us to draw, to care for here? When the he hears an “eternal note of sadness” (112) in the waves at Dover, he asks us to register how forms record a longer history through which difference is organized into violence, a history that, in maritime historian John Gillis’s terms, does not “stop at the water’s edge.”[[65]](#footnote-65) The violent collapse of the Greek empire, read by Matthew and his father through the lens of racial interference, crystallizes the significance of Matthew’s own marriage (he composed part of the poem during his honeymoon at Dover) as a facet of the racial union that constituted England, a remarriage of the Saxon and Celtic “essences” that, as Appiah explains, underwrote Arnold’s conception of Englishness.[[66]](#footnote-66) To stay “true” here is to stay oriented, to cleave together, or, like the white cliffs of Dover, risk being cloven apart by a blackening nighttime sea. To be true is also to incorporate nationalism, as Pheng Cheah explains it, “as a form of recursive self-mediation, an organic prosthesis of the living national body.”[[67]](#footnote-67) In the mode of Glissant’s taking into one, it superposes reproductive futurity, racial fidelity, and nation into a singular relation of care for the English, with indifference or harm to others. It is a plea to keep the lights on and consummate whiteness.

5. White Formations

Insofar as waves mark the collective transmission of power, they also call attention to the *power* of forms – the energies that produce and sustain them. Forms are powerful because of the energies they gather and focus, whether human or fossil; they transfer energies and have long reverberating effects. And insofar as forms embed history, we may also read the complex histories of their power.

Helen Oyeyemi provides a powerful reading of the compaction of the whiteness and xenophobia at Dover in her novel *White is for Witching* (2009). Set (mostly) in the modern day, it centers on a house that stands near the white cliffs, and on the four generations of women who have inhabited it, using these figures to tell a much deeper history of the racial violence in the United Kingdom and its former empire. It is also a formal meditation on the capacity of Gothic fiction to excavate the violent legacies of history, and the way these legacies are woven into the land and its built environments as much as the lives of people.

The narrative of *White is for Witching* swirls around the disappearance of pale Miranda Silver, who suffers from pica, a compulsion to eat non-food items. Miranda prefers chalk. When he wrote “Dover Beach,” Arnold did not know that its white chalk cliffs were made from the calcium shells of coccolithophores, white formations, redolent of English identity, produced from trillions of tons of compressed marine skeletons. Arnold’s poem laments how this towering symbol is torn away by the sea, but Oyeyemi reads it as a structuring metaphor for historical sedimentation, and the way England and its whiteness built up over time. In the end, Miranda’s body (like those of her mother, grandmother, and violently racist great grandmother), is deposited beneath the house, superposed on her maternal line, pressed into a history of xenophobia, racial violence, colonial and postcolonial exploitation.[[68]](#footnote-68) The wider point is that a formation like whiteness, with its seemingly monolithic power, is built up from a trillion acts of violence and exclusion, including (as Miranda’s namesake, alongside numerous references to nineteenth-century literature, suggest) the violence of literature and its “genre of the human.”[[69]](#footnote-69) Such patterns sediment over time, compressed into the architectonic structure of modernity.

But even if Miranda’s plot demonstrates, as Oyeyemi has put it, that “there’s no escape” from the story of white supremacy, other characters show, through their distinct relations to that story, that its hold is *not* monolithic, that the lives lost in its violence can be excavated, brought to attention and care.[[70]](#footnote-70) These alternative relations are amplified in the narratives of Miranda’s housekeeper, Sade, and Ore Lind, Miranda’s girlfriend. As naturalized Nigerian immigrants, like Oyeyemi herself, they bring a critical perspective that interferes with the power that haunts the Silver house. Sade and Ore’s status as immigrants also sets the contents of the house in relation to the novel’s extants – its extensive engagement with the immediate history of the refugee and immigrant crisis. Set at the turn of the millennium, amid a swell of anti-immigrant sentiment in England, the novel circles a historic incident. When they hear that 58 Chinese immigrants have been found in the port, suffocated within a truck container, Miranda asks: “what is wrong with Dover?”[[71]](#footnote-71)

Sade’s cryptic response: it is the “key to England.”[[72]](#footnote-72) The deaths of the Chinese immigrants (with the exception of the Lockerbie bombing, the largest mass murder in modern British history), alongside further references to anti-immigrant violence, serve as the novel’s historical correlative. The Dover container disaster rallied both humanitarian efforts to improve Britain’s policy toward immigrants, and far-right activists who demanded the government keep “England for the English” by closing immigration.[[73]](#footnote-73) Outcry over the tragedy precipitated the creation of Dover’s Immigrant Removal Center, a facility that, in the name of giving illegal immigrants “humane accommodation” locked them into a former prison.[[74]](#footnote-74) Oyeyemi, who studied social policy at Cambridge, explores the relation between the segregating logic of the detention center and the house itself, which attempts to cordon “incomers” from its white owners by either driving them out or digesting them (137). Her strategic use of the Gothic, especially vampire myths, interrogates these waves of predatory violence as what Sharpe calls the “past that is not past” (9).[[75]](#footnote-75) The novel continually interrogates and opens up such containments to their wider relations. Sharpe, posing a similar question about the place of shipping containers in the international refugee crisis, asks “How are they connected to the containerization of people prior to and during and then after that perilous sea voyage?” (29). Sharpe’s point, as I read it, is that containers do not enclose, but instead, open ecologies of relation, including predation. Containers superpose itineraries and histories.

As Nigerian immigrants, Ore and Sade reflect the convergence of two distinct waves of emigration. Like Oyeyemi herself, Ore is born at a crest in Nigerian immigration during in the 1980s, reflecting the collapse of the world oil market, which disproportionately impacted the salaries of white-collar workers. Sade, by contrast, seems to come from a more rural Yoruba community, the backbone of Nigerian agriculture, and a longer swell of immigration that responded to both the political and economic turmoil that succeeded Nigerian independence and the mounting costs of pollution and climate change.[[76]](#footnote-76) The harm to Yoruba agriculture caused by Nigeria’s oil industry after 1970 (an industry systematically developed by British colonial interests) was not singly mediated by the earth system through global warming and desertification: oil extraction and the flaring of waste gas lead directly to local heat pollution and acidification of the rain and soil.[[77]](#footnote-77)

Conclusion

Between Ore and Sade, an émigré impelled by shocks in the global petroleum industry, and a climate refugee whose relation to nature has been displaced, one might see the opposition, recently sharpened by Dipesh Chakrabarty, between the “global” regime of capital and the “planetary” perspective of the earth system.[[78]](#footnote-78) Chakrabarty remains skeptical of the impact of “debates about issues like climate justice, climate refugees and their rights, democracy and global warming” (25), insofar as their “ideal forms” are restricted to the conceptual “domain” of the global (28). By contrast, the ecology of form reads domains, whether global or planetary, as forms that are not discrete, integral, organic formations, but rather, ensembles of practices, of component forms that amplify and interfere in complex ways, lifted by patterns of thought that, as Tobias Menely and Jesse Oak Taylor put it, always “exceed the human social relation and encompass planetary flows of energy and matter.”[[79]](#footnote-79)

Finally, the ecology of form suggests why there are no “ideal” forms: forms are worldly, existing through material relations, and in natural-social ensembles that do as much to undermine hard distinctions between the planetary and the global, as between natural and human history. The present crisis of both human and nonhuman flourishing, whether described as the Anthropocene, Capitalocene, or Plantationocene, demands not so much a new philosophical *anthropology*, as a renewed philosophical *ecology* that looks backward as much as forward, and that does not so much carve out an exception for human values, as place them in relation to forms of value beyond (and not simply for) the human.

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1. Sandra Macpherson, “A Little Formalism,” *ELH* 82, no. 2 (2015): 389–90. [↑](#footnote-ref-1)
2. It is unclear if *forma* is actually derived from *morphe*; Klein speculates a connection through Etruscan. *Comprehensive Etymological Dictionary of the English Language* (Amsterdam: Elsevier Scientific, 1971), 291.For more on Aristotle’s theory of form and hylomorphism, see Wilfrid Sellars, “I. Substance and Form in Aristotle,” *Journal of Philosophy* 54, no. 22 (1957): 688–99; S. Marc Cohen, “Hylomorphism and Functionalism,” in *Essays on Aristotle’s De Anima*, ed. Martha Craven Nussbaum and Amelie Rorty (Oxford: Oxford Univ. Press, 1992), 57–73; Kathrin Koslicki, “Aristotle’s Mereology and the Status of Form,” *Journal of Philosophy* 103, no. 12 (2006): 715–36. [↑](#footnote-ref-2)
3. The transmissibility of form explains its seeming transcendence without recourse to Platonic idealism: “Thus obviously there is no need to set up a form [eidos] as a [transcendent] pattern ... ; the thing which generates is sufficient to produce, and to be the cause of the form in the matter” “Metaphysics, Book 7, Section 1034a,” trans. Hugh Tredennick, accessed September 25, 2019, http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0052%3Abook%3D7%3Asection%3D1034a. [↑](#footnote-ref-3)
4. Édouard Glissant, *Poetics of Relation* (Ann Arbor, 1997), 146. All further citations given by page. [↑](#footnote-ref-4)
5. Jonathan Kramnick and Anahid Nersessian have recently criticized interdisciplinary accounts of form, proposing a “discursive pluralism” derived from debates within the philosophy of science over the relation between formalism and ontology. “Form and Explanation,” *CI* 43, no. 3 (2017): 669. But why can’t disciplines have multiple objects, with some objects discrete and some shared? In carving the joints of the world to correspond with the disciplines (on the model of the sciences), they exchange radical reductionism for radical *irreductionism*: the claim that *none* of the key objects of different disciplines are shared. [↑](#footnote-ref-5)
6. Along these lines, see Dipesh Chakrabarty, “The Climate of History,” *CI* 35, no. 2 (2009): 197–222; Isabelle Stengers, *Cosmopolitics 1* (Minneapolis, 2010), 4–5; Bruno Latour, “Agency at the Time of the Anthropocene,” *NLH* 45, no. 1 (2014): 12; Donna Jeanne Haraway, *Staying with the Trouble* (Durham, 2016), 3. In light of such arguments, there has been a boom in anthropological and literary discussions of the material and empirical engagement of form; for some recent accounts, see Stefan Helmreich, *Alien Ocean* (Berkeley, 2009); Eduardo Kohn, *How Forests Think* (Berkeley, 2013); Devin Griffiths, *The Age of Analogy* (Baltimore, 2016); Amanda Jo Goldstein, *Sweet Science* (Chicago, 2017); Benjamin Morgan, *Outward Mind*, (Chicago, 2017); Tobias Menely and Jesse Oak Taylor, *Anthropocene Reading* (University Park, 2017); Nathan K. Hensley and Philip Steer, *Ecological Form* (New York, 2018); Ian Duncan, *Human Forms* (Chicago, 2019). [↑](#footnote-ref-6)
7. Elizabeth A. Grosz, *The Nick of Time* (Durham, 2004); Eugenie Brinkema, *Forms of the Affects* (Durham, 2014). [↑](#footnote-ref-7)
8. In his first studies of fossil barnacles “form” is the morphological counterpart of “species,” its definitive and fixed physical structure: “having the power to identify [species] with ease” proves “the exhaustless fertility of Nature in the production of diversified yet constant forms.” *Fossil Lepadidæ* (London, 1851), 2. [↑](#footnote-ref-8)
9. “Now if we reflect that form, size, state and nature of the surface ... are all highly variable in most of the species ... we shall perceive how difficult it must ever be to distinguish the species from external characters.” *Cirripedia* (London, 1854), 3. [↑](#footnote-ref-9)
10. Charles Darwin, *Origin of Species* 1st ed.(London, 1859), 77. [↑](#footnote-ref-10)
11. Darwin, *Variation ... Under Domestication* (London, 1868) 2:404. [↑](#footnote-ref-11)
12. Darwin, *Origin of Species*,6th ed. (London, 1872), 101. Emph. added. [↑](#footnote-ref-12)
13. This description of form, Henry Turner notes, “describes a ragged unity, at many scales: it is the unity of a cloud, not that of a stone or of a set.” “Lessons from Literature for the Historian of Science” *Isis* 101, no. 3 (2010): 586. [↑](#footnote-ref-13)
14. Wynter, "Unsettling the coloniality of being/power/truth/freedom" *New Centennial Review* 3 no. 3 (2003): 317-8. [↑](#footnote-ref-14)
15. Wynter describes these evolutionary proposals as “meta-Darwinian.” Wynter, "The ceremony found" in *Black Knowledges/Black Struggles* (Liverpool: Univ. of Liverpool Press, 2015): 194 n. 18. [↑](#footnote-ref-15)
16. Sylvia Wynter and Katherine McKittrick *Sylvia Wynter* (Durham: Duke, 2015). [↑](#footnote-ref-16)
17. Darwin, *Descent of Man* (London, 1871), 1:214. [↑](#footnote-ref-17)
18. Anthony Appiah, “Race, Culture, Identity” (Tanner Lectures, 1994), <https://philarchive.org/archive/APPRCI>. Darwin, in Elizabeth Grosz’s account, similarly “provides feminist and cultural theory with a way of reconceptualizing the relations between the natural and the social, [and] between the biological and the cultural.” (Grosz, 91) while Haraway invokes Darwin’s “capacity to tell big-enough stories without determinism, teleology, and plan” (Haraway, 50). [↑](#footnote-ref-18)
19. On preformation and epigenesis, see Joseph Needham, *History of Embryology*, ed. Arthur F. W Hughes (New York, 1959), Peter J. Bowler, “Preformation and Pre-Existence in the Seventeenth Century,” *Journal of the History of Biology* 4:2 (1971): 221–44; Tobias Cheung, “The Hidden Order of Preformation,” *Early Science and Medicine* 11:1 (2006): 11–49; Shirley A Roe, “Rationalism and Embryology,” *Journal of the History of Biology* 12 (1979): 1–43. Epigenesis has become an active area of concern in literary scholarship on the eighteenth and nineteenth centuries. See Devin Griffiths, “The Fertile Darwins,” *RaVoN* 66-7 (Fall 2016): 1-34; Goldstein, *Sweet Science*; Duncan, *Human Forms* (Princeton, 2019); Devin Griffiths, “Silas Marner and the Ecology of Form,” *VLC* 48:1 (2020): 299–326. [↑](#footnote-ref-19)
20. See Paul Farber’s detailed review of the relation between Buffon’s reproductive species definition and the “moule intérieur.” “Buffon and the Concept of Species,” *Journal of the History of Biology* 5:2 (1972): 263. [↑](#footnote-ref-20)
21. Claude-Olivier Doron sees Buffon’s theory as determinative for later discussions of race “Race and Genealogy” *Humana.Mente* 22 (September 2012): 75–109. [↑](#footnote-ref-21)
22. Demarest, “Kant’s Epigenesis” *History and Philosophy of the Life Sciences* 39:1 (2017): 14. Demarest gives an extensive discussion of Kant’s epigenetic engagement, including a review of the contrary case for Kant’s preformism. See also John H. Zammito, “From Natural History to History of Nature” in *Gestation of German Biology* (Chicago, 2019): 172–85. [↑](#footnote-ref-22)
23. Immanuel Kant, “On the Different Races of Man,” in *Race and the Enlightenment*, ed. Emmanuel Chukwudi Eze (Malden, 2009): 42–43. All further references given parenthetically by page. See also the discussion in Stella Sandford, “Kant, Race, and Natural History,” *Philosophy & Social Criticism* 44:9 (November, 2018): 950–77. In Rachel Zuckert’s account, the purposiveness of Kant’s “whole-formalism” secures all of his statements regarding aesthetic judgment and the importance of unity in diversity “The Purposiveness of Form,” *Journal of the History of Philosophy* 44:4 (October, 2006): 599–622. Jennifer Mensch has given the most extensive attention to the regulative principles of Kantian organic wholism. *Kant’s Organicism* (Chicago: Univ. of Chicago, 2015). [↑](#footnote-ref-23)
24. Andy Blunden, “Goethe, Hegel and Marx,” *Science and Society* 82:1 (2018): 11–37. [↑](#footnote-ref-24)
25. For an extended discussion of Goethe’s morphology and Kant, including his use of *aufheben*, see Eckart Förster, *Twenty-Five Years of Philosophy* (Cambridge, MA: Harvard Univ. Press, 2017), 260–91. My reading of Goethe’s organic morphology also draws on Robert J. Richards; see also Goldstein’s contrasting analysis of Goethe as an anti-organic and “proto-ecological” materialist. Richards, *The Romantic Conception of Life* (Chicago, 2002), chap. 11; Goldstein, *Sweet Science*, chaps. 2-3. [↑](#footnote-ref-25)
26. Johann Wolfgang von Goethe, *Metamorphosis of Plants* (Cambridge, 2009), 8. [↑](#footnote-ref-26)
27. Förster, *Twenty-Five Years of Philosophy*, 273–302. A hundred years on, D’Arcy Wentworth Thompson similarly explained organic form through the providential action of mechanical forces within biological systems, with evident references to Aristotelian epigenesis. Thompson, *On Growth and Form* (Cambridge, 1917), 653–60. [↑](#footnote-ref-27)
28. Richards, “Ernst Haeckel’s Alleged Anti-Semitism and Contributions to Nazi Biology” *Biological Theory* 2 no. 1 (2007): 97-103. [↑](#footnote-ref-28)
29. Ernst Haeckel, *Die Natürliche Schöpfungsgeschichte* (Berlin, 1870), 75. See the discussion in Benoît Dayrat, “The Roots of Phylogeny,” *Systematic Biology* 52 no. 4 (2003): 518. [↑](#footnote-ref-29)
30. Zakiyyah Iman Jackson, *Becoming Human*, (New York, 2020), 173. [↑](#footnote-ref-30)
31. Quoted in Robert C Stauffer, “Haeckel, Darwin, and Ecology,” *The Quarterly Review of Biology* 32:2 (1957): 140. [↑](#footnote-ref-31)
32. Ibid. [↑](#footnote-ref-32)
33. Frederic E Clements, *Research Methods in Ecology* (Lincoln, 1905), 220, 199; John F. V. Phillips, *Biotic Community* (Cambridge, 1931), 20. [↑](#footnote-ref-33)
34. Curtis Marez, “Racial Ecologies,” in *Racial Ecologies*, ed. LeiLani Nishime and Kim D Hester Williams, (Seattle, 2018), xii. [↑](#footnote-ref-34)
35. Rob Nixon, *Slow Violence and the Environmentalism of the Poor* (Cambridge, 2011); Kyle Whyte, “Settler Colonialism, Ecology, and Environmental Injustice,” *Environment and Society* 9:1 (2018): 125–44; LeiLani Nishime and Kim D Hester Williams, “Introduction: Why Racial Ecologies?,” in *Racial Ecologies*, (Seattle, 2018), 3–15. [↑](#footnote-ref-35)
36. For a discussion of the instrumentalism of sustainability discourse, see Deanna Kreisel, “‘Form against Force’: Sustainability and Organicism in the Work of John Ruskin,” in *Ecological Form*, ed. Nathan K. Hensley and Philip Steer (New York, 2018), 101–20. Uexküll saw his account as a way to prove, contra Darwin, that a higher plan or *Aufbau* governs biological development, “borne by meaningful instructions indicative of a spirit that had created this methodical unity” (Quoted in Geoffrey Winthrop Young, “Afterword,” in *Foray into the Worlds of Animals and Humans*, ed. Joseph D O’Neill and Dorion Sagan (Minneapolis, 2010), 210. Even as Gibson gives an account of form that is rooted in relations, those relations are twined around their utility to an observer; ecology is restricted entirely to what it “*offers* the animal, what it *provides* or *furnishes*.” *Ecological Approach to Visual Perception* (Hillsdale, 1986), p.127. [↑](#footnote-ref-36)
37. Stephen Nathan Haymes, “An Africana Studies Critique of Environmental Ethics,” in *Racial Ecologies*, ed. LeiLani Nishime and Kim D Hester Williams (Seattle, 2018), 42. [↑](#footnote-ref-37)
38. Jonathan Kramnick, *Paper Minds* (Chicago, 2018), 1-3. [↑](#footnote-ref-38)
39. Mbembe, “Decolonizing Knowledge and the Question of the Archive” (2015). [↑](#footnote-ref-39)
40. The ostrich-like rhea of South America, which Darwin extensively hunted during his Beagle voyage, is one example; the Argentine naturalist W. H. Hudson later railed: “He may scorn the horse and his rider, what time he lifts himself up, but the cowardly and murderous methods of science, and a systematic war of extermination, have left him no chance.” *Naturalist in La Plata* (London, 1892), 28. See discussion in Cannon Schmitt, *Darwin and the Memory of the Human* (Cambridge: Cambridge Univ., 2013), chap. 4. [↑](#footnote-ref-40)
41. Sylvia Wynter, “Beyond the Word of Man,” *World Literature Today* 63:4 (1989): 638. [↑](#footnote-ref-41)
42. On Glissant’s relationality, see Natalie Melas, *All the Difference in the World* (Stanford, 2007), 105. [↑](#footnote-ref-42)
43. Siri Von Reis and Frank J Lipp, *New Plant Sources for Drugs and Foods* (Cambridge MA, 1982), 281. [↑](#footnote-ref-43)
44. Karen Barad, *Meeting the Universe Halfway* (Durham, 2006). [↑](#footnote-ref-44)
45. This essay draws significant inspiration from Caroline Levine’s *Forms* (Princeton, 2015), even as it replaces that study’s use of Gibsonian affordance with a more fully ecological account of form’s material society. [↑](#footnote-ref-45)
46. For a recent reading of Focillon and the other “inessential” theories of form formulated within art history, see S. Pearl Brilmyer and Filippo Trentin, “Toward an Inessential Theory of Form” *Criticism* 61 no. 4 (Fall 2019): 481-508. T. J. Clark posits that “form is controlled repetition,” a “way of capturing nature’s repetitiveness and making it human,” “More Theses on Feuerbach,” *Representations* 104:1 (2008):7, 4. [↑](#footnote-ref-46)
47. William Morris and Brian Massumi also emphasize what they term the “eventfulness of form”, *Collected Works of William Morris* vol. 22 (London, 1914), 4; *Architectures of the Unforeseen* (Minneapolis, 2019). [↑](#footnote-ref-47)
48. Levine, *Forms*, 8, 62. [↑](#footnote-ref-48)
49. Barad, *Meeting the Universe Halfway*, 255. [↑](#footnote-ref-49)
50. (*Meeting the Universe Halfway* 29); *Black Shoals* (Durham, 2019), 30. [↑](#footnote-ref-50)
51. Sumo Cho, Kimberlé Crenshaw Williams, and Leslie McCall, “Toward a Field of Intersectionality Studies” *Journal of Women in Culture and Society* 38, no. 4 (2013). [↑](#footnote-ref-51)
52. So, André Jolles argues that complex forms, like architectural styles or literary genres, are built of the interplay of more basic, “simple” forms. Jolles, *Simple Forms* (New York, 2017). [↑](#footnote-ref-52)
53. D. A. MacLulich, *Fluctuations in the Numbers of the Varying* Hare (Toronto, 1937); see discussion in J. Patrick Finerty, “Cycles in Canadian Lynx,” *American Naturalist* 114, no. 3 (1979): 453–55. [↑](#footnote-ref-53)
54. Michael E Gilpin, “Do Hares Eat Lynx?,” *American Naturalist* 107, no. 957 (September 1, 1973): 727–30. [↑](#footnote-ref-54)
55. Alan Pickering, *Mange of Practice* (Chicago, 1995);Ian Hacking, *Why Does Language Matter to Philosophy?* (Cambridge, 1982); Ian Hacking, *Representing and Intervening* (Cambridge, 1983); Peter Galison, *How Experiments End* (Chicago, 1987). [↑](#footnote-ref-55)
56. Barad, 67. [↑](#footnote-ref-56)
57. To take an example, Andrea Whittle and André Spicer argue that actor network theory: (1) *naturalizes* descriptions of behavior, rather than critically “recognising that the way things are is neither natural nor inevitable”; (2) is *un-reflexive*, rather than “recognising the role of the analyst in the construction of knowledge”; and (3) is *anti-performative*, reflecting a “means-end rationality that reinforces existing relations” rather than “considering possibilities for new forms of social order.” “Is Actor Network Theory Critique?,” *Organization Studies* 29, no. 4 (2008): 611–29. [↑](#footnote-ref-57)
58. Anna Tsing, *Mushroom at the End of the World:* (Princeton, 2017), 22. [↑](#footnote-ref-58)
59. Sharpe, *In the Wake* (Duke, 2016), 14. All further references given by page. [↑](#footnote-ref-59)
60. David N. Pellow, “Toward a Critical Environmental Justice Studies” *Du Bois Review* 13, no. 2 (2016). [↑](#footnote-ref-60)
61. King, *Black Shoals*, 3. [↑](#footnote-ref-61)
62. Arnold, *New Poems* (London, 1867), 113. [↑](#footnote-ref-62)
63. Stefan Helmreich, “Old Waves, New Waves,” in *Fluid Frontiers*, ed. John Gillis and Franziska Torma (Cambridge, 2014), 76-88. [↑](#footnote-ref-63)
64. (3:xv) [↑](#footnote-ref-64)
65. Gillis, “The Blue Humanities,” *Humanities* 34:3 (May/June 2013). [↑](#footnote-ref-65)
66. Appiah, “Race, Culture, Identity,” 82. [↑](#footnote-ref-66)
67. Cheah, *Spectral Nationality* (New York, 2003), 11. [↑](#footnote-ref-67)
68. Reversing the impulse through which, as Kathryn Yusoff explains, “Whiteness (as a formation of power) gets to ‘choose’ environmental conditions.” Yusoff, *A Billion Back Anthropocenes or None* (Minneapolis, 2018), 55. [↑](#footnote-ref-68)
69. See Wynter, passim. [↑](#footnote-ref-69)
70. Claire Armistead, “Book of the Week” *Guardian* (June 18, 2009). [↑](#footnote-ref-70)
71. Oyeyemi, *White Is for Witching* (New York, 2014), 125. All further references given by page. [↑](#footnote-ref-71)
72. John Sweeney, “From Here, Dover Looks Good,” *Guardian* (Aug. 22, 1999). [↑](#footnote-ref-72)
73. Charles Bremner, “England for the English” *Times* (Apr. 9, 2001). [↑](#footnote-ref-73)
74. “The Detention Centre Rules 2001” (Queen’s Printer Acts of Parliament), https://www.legislation.gov.uk/uksi/2001/238/made. [↑](#footnote-ref-74)
75. For a discussion of vampirism and the Soucouyant myth in *White is for Witching,* see Helen Cousins, “Helen Oyeyemi and the Yoruba gothic” *Journal of Commonwealth Literature* 47 no. 1 (2012): 47–58. [↑](#footnote-ref-75)
76. Oyejide, “Adjustment with Growth: Nigerian Experience with Structural Adjustment Policy Reform” *Journal of International Development* 3, no. 5 (1991): 285–98. Falola and Childs, *The Yoruba Diaspora in the Atlantic World* (Bloomington, 2005); Roland Pongou and Blessing U. Mberu, “Nigeria” migrationpolicy.org (June 30, 2010), https://www.migrationpolicy.org/article/nigeria-multiple-forms-mobility-africas-demographic-giant. [↑](#footnote-ref-76)
77. Phia Steyn, “Oil Exploration in Colonial Nigeria,” *Journal of Imperial and Commonwealth History* 37 no. 2 (2009); Ladan, “An Appraisal of Climate Change and Agriculture in Nigeria,” *Journal of Geography and Regional Planning* 7 no. 9 (Nov. 2014): 176-84. Ian Baucom, drawing on climate science, terms such changes “climate forcings,” linking the climate crisis and the history of the Black Atlantic. Baucom *History 4° Celsius* (Durham, 2020). [↑](#footnote-ref-77)
78. Chakrabarty, “The Planet” *CI* 46:1 (2019): 1-31. All further references given by page. [↑](#footnote-ref-78)
79. Menely and Taylor, 5. [↑](#footnote-ref-79)