

Trophic and Tropic Dynamics: An Ecological Perspective of Tropes

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North of the Galapagos Islands, at the tectonic boundaries of the seafloor where the Earth's plates are pulling apart, magma rises from our planet's scorching mantle, allowing for the formation of hydrothermal vents. Here, cold seawater travels through cracks in the Earth's crust, creating hot, mineral-rich plumes rising from the seafloor's spreading center. Despite harsh conditions from high pressure and the super-heated water, there are ecosystems teeming with mussels, crabs, and other large and fast-growing fauna living in utter darkness.¹ This phenomenon astounded scientists aboard the deep-sea submersible, *Alvin*, when they visited this

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previously unseen marine ecosystem for the first time in 1977. That visit reorganized scientific explanations about how energy and nutrition are transferred between organisms through feeding within ecosystems, otherwise known as “trophic dynamics.”²

Prior to the late nineteenth century, it was believed that the deep sea was azoic—devoid of life. Even after initial samples of living organisms were brought up from great depths, it was still suggested that organisms in the deep sea were necessarily sparse and small in size due to the absence of light and thus a lack of food.³ Life at these great distances was thought entirely to depend on the small fraction of organic matter that survived the long journey from the sun-lit surface waters. However, the flourishing ecosystem at the Galapagos Islands’ hydrothermal vents aroused new questions concerning food webs in the deep sea: who are the primary producers in this ecosystem, and how do they acquire nutrition without the assistance of the sun? As ecologists eventually learned, they are chemosynthetic bacteria, and they use the energy from the mineral-rich water to convert inorganic matter into nutrition for themselves and other organisms.

These chemosynthetic bacteria, whose relatives are believed to be among the earliest forms of life on earth, are turning inorganic matter into organic life. The energy obtained by the bacteria from the sulfide-rich seawater is used to produce biomass, which can be transferred to larger organisms.⁴ Giant tube worms, *Riftia*, with bright red plumes extending into the mineral-laden water, thrive at the hydrothermal vents; each can grow up to three meters in length. Lacking a mouth and a gut, they do not devour the chemosynthetic bacteria; rather, the bacteria live within them. The tube worm receives its nutrition through an endosymbiotic relationship—the living of one organism within another—and in this case the relationship produces a shared advantage. Bacteria benefit from a constant source of oxygen and sulfides that are carried through the plumes of the tube worm directly to the bacteria’s dwelling. In turn, the tube worm is provided a constant source of nutrition from the chemosynthetic attribute of its bacterial inhabitants. This tight coupling between organisms greatly benefits marine ecosystems and allows for increased biological productivity. The volatile conditions of hydrothermal vents drive a diversity of adaptive morphologies and physiologies for organisms to thrive and survive in this unique environment.

That the ocean is filled with polymorphic life was no mystery to the archaic Greeks, whose mythology anthropomorphized ecological relationships. Their god of the ocean, Oceanus, and goddess of the sea, Tethys, produced a daughter known for her suppleness, malleability, and shape-shifting features: Metis. Her polymorphic powers made her more clever “than all mortals.”⁵ Metis’ wily ways and cunning intelligence so impressed Zeus, king of the gods, that after marrying her he “craftily deceived her” and “put her away in his own belly.”⁶ Like the *Riftia* tube worm, rather than devour Metis, Zeus swallowed her and kept her in “the depths of his own stomach.”⁷ In being combined with the goddess, he could “take counsel” with her on all “things good and evil.”⁸ In other words, an endosymbiotic relationship developed between Zeus and Metis; Metis nourished him “with an attunement to contingencies” and “unexpected situations.”⁹ She endowed Zeus with the ability to turn in multiple ways, so as “not to be bound in [his] turn.”¹⁰ Turning offered the flexibility to escape capture by his adversaries and survive as king of the gods.

The concept of turning has a long relationship with its Greek root *trope*. The regularly rehearsed etymology of *trope* in rhetorical studies attends to Cicero’s articulation of rhetorical style with the Ancient Greek figure “to turn” (τροπή)—as in direction, weather, and war, but also indicative of fashion, habit, and way of life. Considerations of tropes typically emphasize the ability to turn a phrase or pivot on an argument, as with metaphor, metonymy, or synecdoche. However, troping’s decorative expression is not relegated to human speech. As we will argue, troping refers to the complex physical metamorphoses performed through interactions that create possibilities for reasoning and argumentation.

Following Metis and *Riftia*, in this chapter we seek to activate the life of tropes by demonstrating their resonance with ecological thinking.¹¹ An ecological approach is one that emphasizes the relationships between organisms and their environment. Tropes are some of the more ecologically oriented concepts in rhetoric’s history since they are “fundamentally relationships” and “inherent to messy articulations of human-nonhuman engagements.”¹² Cultivating ecological thinking through tropes can assist us as we think through the way human activities affect the natural world, both in how our expressions indicate entanglements with the world and how there are always non-human dimensions to our expression. Ecological thinking foregrounds the importance of complexity and nuance, which is particularly apropos of our contemporary political climate and its treatment of scientific research.

This chapter enacts an ecological perspective of tropes embedded in the mythological emergence of the rhetorical tradition. In particular, we attend to the way tropes nourish—trophe (τροφή)—the creation of socio-bio-physical environments. This ecological perspective contends that tropes—including figures of thought and diction—are dynamic modes of environmental expression. In our discussion we draw on the field of ecology, and in particular trophic dynamics, to exemplify the ecological qualities of tropes, while also emphasizing the ways tropes can inform an ecological perspective of rhetoric.

We proceed by first historicizing the relationship between the fields of rhetoric and ecology over the past two millennia, discussing the emergent dichotomous thinking embedded in conceptualizations of tropes to which our perspective responds. We then consider two ecological qualities of tropes in turn: their interactivity and polymorphism. We conclude by considering the benefit of an ecological perspective of rhetoric for conceptualizing how troping distills complex socio-bio-physical environments, how distillations can obstruct collaborative problem solving, as well as the importance of conceptualizing the social with the environmental in interdisciplinary research, inspired by matters that have emerged from this collaboration between a rhetorical scholar and a marine ecologist. This piece weaves together ecological understandings of trophic dynamics with classical rhetorical theory to build a contemporary ecological understanding of tropes (and rhetoric in general).

ANCIENT TROPING AND DISCIPLINARY ENTANGLEMENTS

Our conceptualization of tropes as dynamic and polymorphic modes of expression emerges from a history of disciplinary entanglements. This section offers a history of the relationship between the fields of rhetoric and ecology with three interrelated purposes: (1) to note the disciplining and partitioning embedded in normalized understandings of both troping and the world; (2) to develop troping as a less disciplined and partitioned engagement with the world; and (3) to constitute troping as a *making-with* the world.

Histories are told in many ways, each version accenting different relationships as they evolve and inform the specious present. In this sense, histories are recursive; they bring forth a different past each time they are performed. Recursion, Nathan Stormer argues, depends on “the figurative action of tropes.”¹³ Tropes work recursively as they bring together

particular events while folding over others. Folding time and space is a tropological event where the present is “a position between past and future held in suspension by ‘innumerable secret folds’.”¹⁴ Any retrospection on history is therefore a recursive history, one where this time and place are troped or turned “into another virtually.”¹⁵ This historical component of tropes is a feature of early oral Greek cultures that did not appear to formalize, define, or separate rhetoric and ecology.

For early oral cultures, the world was filled with poetic expression. Tropes were the “necessary modes of expression of all the first poetic nations,” performing the metamorphoses humans experienced in their everyday environments.¹⁶ Spoken language did not mimic, copy, or stand-in for things; instead language “made use of physical substances endowed with life,” most of which were “imagined to be divine.”¹⁷ Natural phenomena were attributed agencies as gods incarnate, where changing landscapes, weather, and water were infused with mystical forces.

Stories of the world’s divine beginnings record human interactions with a shifting landscape through epic poetic form. Typically, epic poetry attracts humanities-oriented scholarship that treats the works as literary accomplishments rather than pre-disciplinary histories. Within the last century, however, scholars have delineated historical elements entangled in Greek mythical accounts, particularly as archeologists have revealed evidence of artifacts and buildings described in the *Odyssey* that date back to when it was written. These scholars have “demonstrated that it is rash to underestimate the historical value of folk memory” and that myth can “no longer be dismissed as mere poetic fancies.”¹⁸ Similarly, modern scientists are acknowledging the benefit of integrating traditional ecological knowledge from indigenous peoples with contemporary scientific understanding to address complex environmental problems.¹⁹ Scientific historian Mott Greene agrees, arguing that it is possible to “recapture the natural-historical content” embedded in mythologies passed along through spoken poetry.²⁰ In this way, human experiences are cast through molds of natural events, and worlds are poetically created through impressions—lived connections.²¹ The “semblance of lived history” is discernable only through the “active environment” of the person engaging in the poetry.²² Allegory is one such poetic form that documents human making-with the world.

Allegorical form is a technique that extends and compounds memory, offering the longevity potential of other memory mediums used to create and pass on cultural knowledge. For oral cultures, memory depends

on rhythmic sequences, mnemonic devices, concrete description, and anthropomorphism, while avoiding abstract conceptual vocabularies and subordinate clauses that are too complex for memory recall, such as this sentence. In studying myth for its natural-historical content, scholars “set aside the literary and structural theories” that celebrate an individual author’s creative activity and instead attend to figural descriptions as indicative of relations between organisms and their environments.²³ In this sense, myths offer descriptive scientific accounts of phenomena in their states of becoming.

Hesiod’s *Theogony* provides an exemplar. Greene argues that Zeus’ multiple battles with the Cyclopes are historical accounts of the highly active Mediterranean volcanoes in the fifteenth century BC, accurately preserved “for more than seven hundred years” in the oral tradition.²⁴ Lacking today’s scientific terms for these processes, early people likely anthropomorphized catastrophic eruptions through battle scenes. Employing contemporary volcanology, Greene pays close attention “to the sequence of events in the battles,” including “their appearance, sound, and their effect on the physical world.”²⁵ He argues that the Cyclopes are one-eyed monsters and their hundred arms are descriptions of a volcanic eruption. Zeus’ clash (lightning) with the one-eyed monsters (volcanoes) and their hundred arms (lava flow) occurs amidst the boiling of the earth and sea, intense heat, thunderous cries, and grumbling grounds. Greene contends that the narrative’s sequentially ordered events “are volcanic eruptions described so carefully and in such detail that the volcanoes in question can be identified and the particular eruptions of the volcanoes dated.”²⁶ From this perspective, the *Theogony* is not just a genealogy of the Greek gods, which includes Metis, daughter of the ocean and endosymbiont of Zeus; it is a natural history of archaic people’s relationship with volcanic eruptions.

Our records of this early expression document the active ordering of the cosmos and phenomenal world by combining familiar features in the environment with the self, typically the human body. Although anthropomorphism is less explicit in today’s descriptions of the natural world, all such descriptions indicate relationships between the human and the natural world. Troping is indicative of our relationships to time, space, and sense, and directs the way we understand and study any given phenomenon. Early poetic expression transformed the relationship between the thing and the self.²⁷

In Ancient Greece, then, troping was a making-use of the animate world, a world that did not *have* an order, but was in a constant process of ordering, changing, and taking shape. Tropes were not ordered into neat taxonomies²⁸ and they were not understood as separate from figures and schemes.²⁹ The Latin lexicon of “physical metamorphosis largely overlaps with the lexicon of linguistic change”³⁰:

Cicero uses *immutatio*, “a changing,” as a label to cover the Greek terms *tropos*, “trope” (literally “a turning”), and *schema*, “figure” (*Brutus* 69). Quintilian defines a figure (*figura*, literally “shape”) as “arte aliqua nouata forma dicendi,” “a shape of speaking altered by some art” (*Institutio Oratoria* 9.1.14). Cicero’s definition of allegory as “continuae tralationes,” “continuous metaphors” (*Orator* 94) might equally be translated as “successive transformations,” a precise description of the *Metamorphoses*.³¹

For classical Greeks, changes in language were physical transformations; language did not come before or after the physical, it was manifest in it. Today’s language–matter dichotomy was not readily apparent in classical rhetorical practice; it had to be created.

By the seventeenth and eighteenth centuries, a bifurcation of materiality and language became prevalent in academic and lay thought, and this worked in conjunction with the perception that language was uniquely human.³² At the height of the Enlightenment, there was a perceived boundary between humans and a world filled with discrete objects that could be ordered and classified. Latour refers to this as the development of Modern purification—that is, the creation of “two entirely distinct ontological zones: that of human beings on the one hand; that of non-humans on the other.”³³ Even philosophers who rejected “objectivity” accepted a bifurcation between materiality and human language. Myth and art were thought to be “ephemeral” products of a different “realm” or “domain.”³⁴ Romantic poets “reinforced the dichotomy between truth and reason, on the one hand, and art and imagination, on the other” by embracing the subjectivism of which they were accused.³⁵

Today, communication about the world is not commonly recognized as an expression of the world, as in Greek mythology. Rather, it is regularly conceived as a unique human capacity to transfer to others intellectual thoughts that are in some way spiritually separate from the world itself. This belief is manifest in the typical understanding of how communication functions: through a sender–receiver transmission model.

This is the assumption that ideas can accurately represent reality, be encoded into words, and be transferred to a receiver who can then decode them. It presumes that ideas and words are not immersed in bio-physical relationships, but merely reflect or re-present them. Through representative theories, language became “the core of rhetoric” and has retained this position through either “the view of literary theorists that rhetoric is a quality of the use of language” or in theories of public discourse “in which cultural and political values find expression.”³⁶

The sciences and humanities, which were not so clear-cut in pre-Socratic Greece, became partitioned into specialized areas of study during the mid-seventeenth and eighteenth centuries. Science and its rational foundations were presented as most equipped to discover enduring knowledge. Rhetoric, previously a primary subject of inquiry and a mode of knowledge production, became relegated to linguistic ornamentation. This separation allowed scientists to assume that their formulation and practice of research could be free of rhetoric. Scientists used “literal language” that was presumed to accurately reflect objective reality, with the figural added after if artistic decoration was suitable.³⁷

Divisions among disciplines further encourage the belief in a bifurcated world where the biological and physical are studied in one domain and the capacity of expression in another. The domains are perceived to have distinct methods, vocabularies, and specialties, perpetuating silos. While the scientific field of ecology primarily assumes a representative understanding of language—using definitions to create indexical relationships between words and phenomena—the way ecologists view the natural world is less prone to this bifurcation. Ecologists emphasize interactions between the biological and physical worlds that are not unidirectional, but systemic. Our human interaction and figuration in our own ecosystem is biological and physical, just as other organisms’ biological and physical interactions are figural.

While ecological thinking is as old as Greek mythos, its institutionalization did not occur until Darwin’s evolutionary theory of natural selection gained notoriety. The formal study of ecology dates back to the mid-nineteenth century, emerging as a subfield of biology. Ernst Haeckel coined “ecology” in his 1866 *General Morphology of Organisms*, a two-volume work that promoted Darwin’s *Origin of Species*. Haeckel derived the name from the Greek *oikos* (the English prefix eco-, for house, dwelling place, habitat) and *logia* (for “the study of,” a derivative of *logos*, one who speaks on or treats of the subject). As a scientific field, ecology

is the study of the interconnectedness of organisms and their habitats. An ecological perspective of rhetoric thus disrupts the bifurcation of expression and materiality and attends to relational complexity; everything is affected by and affects the environment, thereby performing figural expression. Tropes in particular exemplify this, and next we explore two ways in which tropes enact an ecological perspective: through their interactivity and polymorphism.

INTERACTIVITY

Interaction is a fundamental concept in ecology, given that ecology is the study of how organisms interact with one another and their physical environment. All organisms dynamically respond to and shape their surroundings. Interactions, too, are distinctly rhetorical; tropes express interactive relationships between different figures. To treat tropes ecologically is to treat them as interactional forms that affect and are affected by their interactions, rhetorically. All living forms experience “an imperative to respond” resulting from an irreducible relationality and interactional dynamics.³⁸ The different modes of response, or response-abilities, are indicative of different tropes. Thus, the ways organisms interact with each other and their environments are tropic.

The modes of response that ecologists study can be understood rhetorically as tropic forms. Ecologists study, for example, how environmental stressors produce behavioral responses of organisms. An ecosystem with particularly intense environmental pressures is the rocky intertidal; here, organisms must cope not only with the extreme force of pounding waves but also with the twice daily receding of the tides. Since the organisms that inhabit this environment are marine, they are unable to feed when exposed to air and risk desiccation. When the tide goes out, the organisms enact certain behaviors—responses—to counter these hazards. Some shelled organisms, like limpets, cling tightly to the rocks, creating a watertight seal to keep moisture in. Other organisms, like sea anemones, retract their tentacles and adorn themselves with fragments of shells. And some organisms, like crabs, are mobile enough to simply seek out low-lying areas where they can remain underwater. From an ecological perspective of rhetoric, these recurring forms of response are tropes; dynamic relationships between organisms and environments. Tropic forms repeat, indicating a repetition of form, but simultaneously indicate a transformation, a relational change.³⁹

The simultaneous repetition of form and relational change in an ecological perspective of troping is evident in mythopoeic writing, where communication is understood as a type of nourishment—trophe—to be consumed. Archaic communication in the Western tradition was not meaning-oriented or separate from the body, but a bio-physical transformation of bodies. The *Iliad* and *Odyssey* document this archaic communication process through two words that appear most frequently in the texts: *phrenes* and *thumos*. Communication took “place when one person breath[ed] their words [*thumos*] into the *phrenes* of another...the passage of words physically—bodily.”⁴⁰ Not easily translatable, *phrenes* were likely to have been situated in the chest and were the locations where *thumos* were trapped. *Thumos* is deciphered as a “substance frequently ‘poured’ into the *phrenes*” and served as a trope for life generally, sharing similar features with breath and blood.⁴¹

As tropes of nourishment and life, *thumos* and *phrenes* regularly interact to instigate action and ignite solutions. In the *Iliad*, Ajax’s *thumos* desires confrontation, “mine own *thumos* also within my breast is the more eager to war and do battle.”⁴² Hector trusts the advice of his *thumos*: “Listen to me, you Trojans and strong-grieved Achaeans, while I speak what the *thumos* within my breast urges.”⁴³ These forms of communication are corporeal interactions, where figurations are shared with and consumed by other bodies. The body is not an object distinct from its environment, but “an aggregate of organs and limbs,” multiple interacting forms, which seem to possess autonomy, dynamic force, and in some cases an agency of their own.⁴⁴

Troping thus understood relies on bodily interactions, and the complexity of these interactions makes it so multiple tropes are entangled in each action. While it is possible to fixate on a singular trope or turn, attending to its individuality in any sustained regard is like attending to a discrete Newtonian object: it can be done only by minimizing its interactional complexity. So, while Kenneth Burke gives the four master tropes—metaphor, metonymy, synecdoche, irony—a special “role in the discovery and description of ‘the truth’,” their promotion to “master” necessarily distills the various other interactions for how “truth” emerges.⁴⁵ This distillation was appropriate for Burke’s particular rhetorical analyses. However, rhetorical scholars should not assume that these four tropes are “master” in every rhetorical analysis.⁴⁶

An ecological perspective, then, treats tropes as interactive forms of expression where biological and physical relationships are tropic forms. The capacity to interact indicates the capacity to trope: to change in

patterned ways creating aesthetic figuration, a taking and making of form.

POLYMORPHISM

An ecological perspective of rhetoric regards tropes as both interactive and polymorphic. Ecologically, the interactions between organisms and their environment produce polymorphism, which is evident in the vast diversity of life forms on earth. The Greek *polymorphos*, from *poly*—many or multiple—and *morphe*—shape or form—has been translated as multi-form, of many forms, and manifold. The latter translation of mani-*fold* is consistent with the function of tropes to fold together interactive forms, creating different figurations. Manifold indicates that folding is not a solitary activity, just as “folding is not a singular trope.”⁴⁷ Rather, troping is manifold and continuously folds into forms.

The many turns, changes of shape, and transformations are indicative of Metis, who is not only a deity, but also a bodily mode of response and corporeal intelligence in Ancient Greece. Pedagogically, students of rhetoric enact Metis’ polymorphism as they adapt to changing circumstances through figuration. Instruction books describe the fluidity and flexibility required to enact Metis’ polymorphic capacities through examples of marine life.⁴⁸ In his *Treatise on Fishing* written in second century AD, Oppian writes about the behavioral adaptations of sea creatures that outwit entities “superior in size and strength” through tricks (*doiloi*).⁴⁹ He treats adaptations as *technē*, an evolved art and craft. For example, the mimic octopus, *Thaumoctopus mimicus*, displays postures and bodily patterns that mimic other animal movements, size, and color expressions. A mimic octopus off the coast of Indonesia was observed to produce the appearance of a poisonous sea snake by sticking six of its arms down a hole and undulating the other two in opposite directions. At other times it was seen with its arms positioned in a leaf-shaped wedge, presumably impersonating a swimming flatfish. Through manipulation of both shape and color patterns, it mimicked and turned into lion fish, damselfish, and sand anemones.⁵⁰ The cleverness, or *metis*, of the octopus inspired Oppian’s praises. The octopus’ *polutropos*, many turns, perform the adaptive capacity of survival in an organism’s changing environment.

Due to the polymorphic quality of the natural world, scientists struggle over how to define and categorize life on earth; this is a profoundly rhetorical problem. Since the dynamics and processes that affect the natural world are extremely complex, scientists employ many ways of

simplifying concepts and distilling information. Although the tendency to sort organisms and phenomena by particular properties or functions can provide a useful perspective, it also poses problems since organisms or other phenomena of study do not always fit neatly into the defined categories. For example, classifying organisms by trophic status—that is, by mode of nutrition—is one way to distinguish among groups of organisms. It was once assumed that organisms could be classified dichotomously as either *autotrophic* or *heterotrophic*. Autotrophs are organisms that can manufacture their own food from inorganic substances by using energy from the sun (e.g., plants) or other sources (e.g., chemosynthetic bacteria). Heterotrophs obtain their nutrition by consuming other organisms or the organic matter derived from them (e.g., animals). However, over time these dichotomous terms proved insufficient to fully describe the complex nature of all nutritional modes in organisms. Pfeffer coined the term *mixotrophy* in 1897 to describe plants that require the presence of organic molecules to photosynthesize—that is, to perform autotrophy using energy from the sun.⁵¹ More recently, the term mixotrophy has evolved to indicate the simultaneous use of autotrophy and heterotrophy in organisms—organisms that utilize both “plant-like and animal-like nutritional modes.”⁵²

Examples like these emphasize the challenge of attempting to understand polymorphism in nature discretely, since natural phenomena occur along a kind of continuous spectrum. In fact, even the classification most fundamental to the field of biology—life—is difficult to categorize; while viruses possess many qualities of living organisms, they lack others and thus are considered entities that are both living and non-living.⁵³

Ecologists cope with masses of information derived from environmental polymorphism through the development of models. Scientific models are, *by design*, synecdochal and do not account for all the complexities of the natural world. The concept of the trophic or biomass pyramid—which may be memorable from grade school textbooks—is a simplification that, while crude, is extremely useful in illustrating how energy is lost as it is passed up the food chain from one trophic level to another. The first trophic level, primary producers (e.g., plants) pass energy to the second trophic level (e.g., herbivores), which is then made available to higher consumers on the pyramid. However with each step in the energy transfer, energy is lost through respiration, waste, and other processes, which results in organisms at the lowest trophic level being in much greater abundance than those at higher trophic levels.⁵⁴

The notion of a trophic level itself is a simplification, since food webs include a complex set of relationships between many different organisms, many of which occur on multiple trophic levels (e.g., omnivores). Although more complex models can be, and have been, constructed to incorporate these aspects, simple models distill an immense amount of information to accent a particular concept and its role in ecosystem dynamics.⁵⁵ While there are different stakes involved in each figuration, trophic dynamics become comprehensible and communicable through the troping of some polymorphic interactions and the folding over of others.

The tendency to simplify and reduce complexities inherent to the polymorphism in ecology is somewhat similar to the way rhetorical scholars catalog and arrange tropes according to their different features. Given the vast ways that forms can interact, there have been hundreds of tropes documented in the rhetorical tradition.⁵⁶ The various ways tropes can and do interact as figures of repetition and change creates great taxonomical diversity.⁵⁷ Classification systems emerged during the Enlightenment and into Modernity as a way to distill the diversity of tropes to ascertain essential features. Today, students of rhetoric tend to master a few tropes rather than several hundreds. For example, Burke's declaration of four exceptional tropes—metaphor, metonymy, synecdoche, and irony—instills a hierarchical order amidst an otherwise polymorphic assemblage.⁵⁸

Rhetorical scholars who seek to classify, order, and distinguish tropes do so in relation to *figures*—pertaining to meaning—and *schemes*—pertaining to pattern. There is rarely agreement about whether tropes are figures or schemes, whether tropes are distinct from figures or schemes, or whether figures and schemes can be considered distinct, that is, whether meaning can be separated from pattern and form. These questions rest on false dichotomies. Complete taxonomical agreement is not possible since meaning “arises out of the matter/form configurations,” explains Celeste Condit, “as they take on and move through specific relationships and relationship patterns that are specified by language.”⁵⁹ Quintilian's attempt to separate tropes from figures by defining tropes as a change in meaning and figures as a change in form is inconsistent and unsustainable across books I, VIII, and IX of *Institutio Oratoria*.⁶⁰ Meaning and pattern are entangled; “changes in form and changes in meaning” as well as “the size or scope of the change” are difficult to distinguish.⁶¹ The differences among tropes are subtle, and the subtle differences indicate their capacities to blend into each other, just as the

boundaries between ocean and land, mountain and valley, river and bank are changing and fluid. There is no empty space between things, and so too is there no empty space between tropes. Everything is attached, a folding form of every sense.

Traditionally rhetorical scholars have privileged sound and sight to explain the structure of tropes, but tropes are polysensual figurations. *Metis* is a shape-shifter of all sense, responding to her ever-shifting terrain in tropes of every sensuous form. Though less discussed in rhetorical studies, this stimulus-driven quality of turning is evident in biologists' adaptations of the Greek *tropos*. Within biology, tropisms refer to the directed movement or growth of organisms incited by their environments: chemotropism (in response to chemicals); gravitropism (in response to gravity); hydrotropism (in response to water); phototropism (in response to light); thermotropism (in response to temperature); electrotropism (in response to electric fields); and thigmotropism (in response to touch). The biological sense of trope (τροπή) accents the responsive quality necessary to stimulate growth or trophic (τροφή). The relationship between these two terms is as entangled as their similar spelling.

Tropic and trophic dynamics emerge from the great complexity of the natural world that cannot be discretely categorized. In both rhetorical studies and ecology, there is a tendency to simplify this complexity in a way that allows it to be more useful and more easily understood. Although this distillation of polymorphism can be helpful and even necessary for community building and scientific inquiry, it is important to be aware of the world's polymorphism as interactive relationships fold form and create expressions that privilege some relationships over others.

CONCLUSION

With an attention to tropes, this chapter has considered the relationship between rhetoric and ecology. An ecological perspective of tropes accentuates their interactivity and polymorphism, emphasizing the world's dynamic figurations. This ecological perspective is one way to conceive of rhetoric's ontology.⁶² Consistent with other rhetorical concepts that enact ecological thinking, tropes are forms of attachment; they cultivate an appreciation for diversity; and they indicate environmental affordances.⁶³ With humans as active participants in this interactivity and polymorphism, we have difficulty coping with all of its complexity.

To navigate these complex systems, we rely on familiar forms to distill the world's expression. Irony, or the tendency to think dialectically, for example, is one particularly prevalent form of distillation.⁶⁴ Distillation cannot and should not be prevented since it is our way of managing environmental complexity; however, we must be prepared to disrupt distillations and reconceive of complexity when distillations prevent collaborative orientations to problem solving.

We have recently witnessed distillations as obstructions to collaborative problem solving, both in the political realm when nuanced analyses are dismissed as unclear and complicated, and when scientists attempt to communicate uncertainty to public decision-makers. Uncertainty is not only unavoidable in scientific research but also an important foundational tenet of the scientific method. Typically, when non-experts circulate research for lay audiences, uncertainty is either completely disregarded, so that the research is presented as undisputable fact, or amplified, so that the research is presented as inconclusive. Many environmental scientists have struggled to communicate research on issues like climate change to the public in a way that is accurate but also appropriately conveys the risks and practical societal implications.⁶⁵

A specific example of an environmental body that has struggled with conveying its research to lay audiences is the Intergovernmental Panel on Climate Change (IPCC), a collection of the world's leading experts on climate change stemming from many disciplines, who are tasked with producing regular assessments of the science of climate change, the impacts associated with it, and potential mitigation plans. Given that climate change is a complex global issue with scientific, economic, social, and political ramifications, the IPCC recognized the importance of carefully quantifying and communicating uncertainty, and a common approach was chosen.⁶⁶ However, despite these efforts, the IPCC's decision to describe uncertainty in their assessment reports using probabilistic statements such as very unlikely or virtually certain has been found to lead to systematic inaccuracies in the interpretations of the IPCC's findings by the public, which in turn can affect democratic decision-making.⁶⁷ Uncertainty is a necessary quality of how information is distilled. In order to understand uncertainty, audiences must be able to conceive of research as a distillation of complex systems. This is a shared goal of educators in both rhetoric and ecology.

Merely amplifying the interactive and polymorphic qualities of rhetoric and ecology's mythopoetic tradition does not itself help scholars

address the wicked problems of the twenty-first century, such as climate change.⁶⁸ However, it does provide a shared orientation to begin collaborating on ways to address them. Tropes indicate relationships in the world and both rhetorical scholars and ecologists study these biological and physical relationships albeit with different theoretical and methodological approaches. Conceptualizing our communication processes as a making-with the world rather than as a representation of the world is one potential shared orientation for collaborating that would emphasize how humans affect and are affected by their environments.

We opened this chapter by sharing stories about two similar endosymbiotic forms, one between the chemosynthetic bacteria and the *Riftia* tube worm and the other between Metis and Zeus. Endosymbiosis is formally related to parembolē, a traditional figure of speech. Similar to parenthesis, parembolē is the inclusion of something else into the subject; however, unlike parenthesis, its inclusion indicates a direct connection to the subject. Figures of speech emerge from biological and physical interactions that are experienced and made useful. Thus, there is a “consistency between the visual and verbal,” explains Fahnestock, that “helps to underscore the fundamental conceptual processes expressed by the figures.”⁶⁹

There are many other examples of parembolē or symbiotic relationships in nature like the chemosynthetic bacteria that inhabit giant tube worms at hydrothermal vents. The relationship between the chemosynthetic bacteria and its tube worm host constitutes a *mutualistic* one since both organisms appear to benefit. However, it is less clear what kind of symbiotic relationship Zeus and Metis shared. It did not appear to be mutualistic, since Metis was provided no advantage from Zeus in the same way that she provided him with counsel and mutation; so Metis was either unaffected or harmed by the relationship. If given the chance to escape, we assume she would, since certainly in a non-mutualistic relationship we would make that choice.

Interdisciplinary interactions, such as those between rhetoric and ecology, can be viewed as symbiotic relationships. But the type of symbiotic relationship changes over time. In archaic Greece, there is evidence to suggest that there were no distinctions between disciplines. In contrast, today our disciplines appear more ironic than parembolic as rhetoric and ecology have borrowed vocabularies from one another without mutual awareness. Our goal here has been to develop a mutualistic relationship between the two such that both rhetorical studies and ecology are not only aware of how each is affected by the other (τροπή), but also thrive (τροφή) because of it.

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