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Affinity Studies and Open Systems:

A Non-equilibrium, Ecocritical Reading of Goethe's Faust

Heather I. Sullivan

Ecocriticism's contributions to the current rejection of dualistic thinking are noteworthy, particularly when this interdisciplinary field concentrates on hybridity and "relations" that pre-exist essences. In this mode, ecocriticism participates in a broader development of "affinity studies" that encompass the many efforts across the disciplines towards reconfiguring our "intra-actions" with the world in terms that avoid dichotomies and Newtonian linearity and that utilize instead non-linear, non-dualistic forms of "hybridity." Hybrids, in Steve Hinchliffe's words in Geographies of Nature, are "more or less durable bodies made up of similarly hybrid and impermanent relations. Things are, to use another commonly used term, configured, or drawn together, in order to become more or less stable forms. There are no pre-existing essences, only relations."¹ In affinity studies, in other words, human agency emerges as a complex entanglement of cultural and physical pulses, or as distributed and part of flows between "open systems." Nature and culture and other such divisions are replaced by hybrid forms with permeable boundaries.

It is in light of affinity studies that I read Goethe's Faust, which may seem contradictory since the play is most frequently understood exactly as that against which I wish to argue here: as the ultimate vision of an individualistic (male, "European," "rational") mastermind who stands alone to alter and seek control over the world. In this essay, however, I explore how the play itself actually undermines such standard interpretations with its triple-frames that contextualize Faust's choices within larger, cosmic, poetic, or theatrical situations, but also with the focus on Mephistophelean influence, and finally on the play's (fluid) structure provided by the water imagery and flows. This is therefore a reinterpretation of Faust as a play questioning rather than exemplifying human control over nature/world; it is a study of unleashed affinities hybridizing individual determination.

Ecocriticism presents a wide range of ideas relevant for affinity studies. Many ecocritics build on Merleau Ponty's dialogics, such as Patrick Murphy's ground-breaking descriptions of a dialogical process of "inter-animating relationships."² A similar strategy can be found in the tendency to emphasize "multiplicities" rather than individual subjects. Eric Todd Smith, for example, provides a paradigmatic shift away from the "subject" as grandiose "agent." He notes with significant relevance for Faust studies: "Perhaps, then, subjectivity should

not be the goal. I suggest we drop the subject of the subject, and that of its defining opposite, the object, as the grand poles staking out existence. Let us think, rather, about multiple mediations and relationships, not marked out by membership in one of the two great camps of subject and object, but rather by specific embodiments, situations, and affinities."³ Dana Phillips' volume, The Truth of Ecology: Nature, Culture, and Literature in America, demonstrates how ecocriticism shares significant affinities with postmodern theory, and it also suggests a focus on hybrids: "I am persuaded that the truth of ecology must lie somewhere, if it lies anywhere at all, in nature-culture, a region where surprising monsters dwell. In order to adapt itself to the vagaries of nature-culture, ecocriticism needs to be more willing to hybridize than it has been: it needs to have a heart and a brain as well as arms and legs, and as many of each as possible, and it should not hesitate to borrow additional body parts here and there as the need arises."⁴ Phillips' nature-culture with its hybrid body-parts exemplifies an affinity-studies emphasis on the fluidity of boundaries, or the openness of systems, even as it notes the monsters that can emerge from a view not dependent on traditional delineations of individual agency. Goethe's Faust, too, portrays a rather monstrous, albeit highly celebrated, figure whose engagement with Mephistopheles is--I am definitely reading

against the grain here--one of affinity not ultimate individuality. Despite the positive nuances of the term "affinity," it is, in fact, as much about association and alliance, or being "drawn towards" something, as it is a repulsion and monstrous breakdown of boundaries flowing into hybridity.

In order to move into affinity studies via ecocriticism and Faust, I explore here an "open-systems" model for ecocriticism that builds on the concepts of "distributed agency" as being on a continuum or open flow of inorganic matter, organisms, ecosystems, and cultural exchanges. In this system there is no absolute separation between environment and organism; rather, every environment makes and is made by the organisms and flows composing it. This model for ecocriticism relates to the images described in Ilya Prigogine's open-system, nonequilibrium thermodynamics, and its shape is a spiraling flow of irreversible time: the image of a galaxy, a hurricane seen from satellite images, a tornado, a snail's twisting shell, or--one can hardly resist noting in light of the environmental debates of the twenty-first century--the water rushing down a flushing toilet.

Prigogine's "new dialogue with nature" emphasizes the solar-energy driven flows among "open systems" (open boundaries exchanging energy, materials, information) including living beings, cultural structures, and ecologies.⁵ It also suggests

what Peter Taylor terms "distributed agency" rather than a singular, monolithic causality. Distributed agency emerges within the interpersonal, cultural, and natural flows around it; that is, it is also "open" to other flows and influenced by affinities within them. An open-systems, distributed agency model for affinity studies is thus much like descriptions of ecological systems where the human-nature interface consists of multiple systems of interacting, yet not necessarily harmonious, flows. An awareness of these systems would require, in Val Plumwoods words, overcoming our "illusory sense of autonomy" and "such monological and hegemonic forms of reason" that "misunderstand their own enabling conditions--the body, ecology and non-human nature."⁶

An affinity-studies model based on open-systems and distributed agency recognizes, indeed, the body, ecology, and non-human nature as "enabling conditions." Unlike Niklas Luhmann whose systems theory proposes a change from the "unity of the social whole as a smaller unity within a larger one (the world) to the difference of the system of society and environment," an open-systems model posits neither "unity" nor "difference" as its "theoretical point of departure."⁷ Instead, it insists on hybridity, relations instead of essences, and the affinities of open systems. Luhmann's discussion relies upon the tension between open and closed systems: "The dynamics of complex autopoietic systems itself forms a recursively closed complex of

operations, i.e., one that is geared toward self-reproduction and the continuation of its own autopoiesis. At the same time, the system becomes increasingly open, i.e., sensible to changing environmental conditions."⁸ His emphasis is on the internal communication of social systems that perceive themselves as closed. In contrast, I suggest a model with greater emphasis on what we so often ignore: the porous boundaries and affinities of our bodies, minds, and cultures integrated with their environments in all forms. Robert E. Ulanowicz, in fact, describes organisms themselves as "super ecosystems," and notes, "In sum, the world is open, not deterministic or rigidly coupled."⁹ Similarly, Richard C. Lewontin states: "Organisms, then, both make and are made by their environment."¹⁰ It is not a unique characteristic of human beings to construct their world, but nor should we ignore the fact that we are also constructed by it. This "being constructed" includes the physical environment and our development within that environment as well as cultural systems. Lewontin's comments indicate an organism-environment continuum of sorts, one of affinities within open systems of exchange, reciprocal shaping, and distributed agency.

I explore Faust in terms of open systems and affinities, noting that the play portrays a "demigod" agent most often described as the "Übermensch," whose power, derives, however, rather problematically from Mephistopheles and the witch's brew.

Faust's endless striving raises the specter of troubled activism--do we emulate his technological "progress" seemingly condoned by his final ascension with the angels, or do we condemn his destructive efforts at "flow-control" with the damming of the sea?¹¹ Faust believes himself to be self-determining, but a look at the pestilent swamps resulting from his dam and his fall into death in contrast to the final leaps of the test-tube Homunculus, and Faust's and Helena's mythical son, Euphorion, shows us the complexity of action and agency in the play. Whereas the "creations" Homunculus and Euphorion are lured by seductive voices to fling themselves (actively) into the water and off the cliffs, Faust falls dead (passively) into the grave he thought was a channel to drain the pestilent swamps left from damming the sea. Indeed, he is inert--dead--when Mephistopheles and the angels engage in an erotic battle over his remains. If his final act and moment of death are significant, then the common view of Faust as primarily a rational and active force appears misled; a more accurate reading notes that the impulses driving Faust and the impulses he creates emerge from a distributed agency, much like the affinities of attraction (and repulsion) in Goethe's 1809 novel Elective Affinities which engage the figures with drives beyond their individual consciousness. If Faust is, as so often is claimed, the "modern man," then it is only as one

suffering under the illusion of being a "self-determining agent" blind to his affinities and "enabling conditions."

One strategy for contextualizing Faust's affinities and enabling conditions is to look at the play's fluid structure, its typically Goethean insistence on nature and world as constantly in motion and in process ("Werden") or metamorphosis. This we find in Faust presented symbolically by the earth spirit and quite concretely by the extensive water imagery in the play. Most scholars note how the play is inundated with references to Goethe's scientific idea of polarity and "Steigerung" (upwards movement, increase); but images of water flow as nature's motion incarnate are equally present in the play. For example, Faust first claims to have an affinity to the earth spirit with its "tides of living, in doing's storm, / Up, down, I wave, / Waft to and fro,"¹² but because the earth spirit scorns him, he then claims not just affinity but in fact shared being with the "waterfall" about to destroy the "little hut" that is Gretchen. He is, he notes: "the homeless rover, / The man-beast void of goal or bliss, / Who roars in cataracts from cliff to boulder / in Avid frenzy for the precipice."¹³

While life in Goethe's view is motion, Faust as waterfall presents a violent force whose affinities smash endlessly downwards; his self-portrait as a waterfall neglects the larger cycle of precipitation and evaporation typical of Goethe's

science. (Although one could postulate that his final ascension actually does, in fact, enact the rise of water in evaporation.) Faust's limited self-description as a waterfall in Part I is, however, also highly relevant for Part II where there are defining water images in each act, beginning in Act 1 with Faust's celebrated rainbow reflected in the crashing waterfall-- whose power and aesthetics he now savors rather than regrets--and ending in Act V with his dam. He progresses from seeking to be like the multidirectional "tides of living" to being a unidirectional "waterfall," and finally to damming the water's tides and flows. This shift in forms of agency has clear consequences, since Faust's quest to stop the flow also concludes with his death. His dam thus becomes the metaphor for the Faustian consciousness that blindly sees its own agency but not its inevitable affinities and "enabling conditions," and thus believes that it can close the open systems of flow.

The model of open-systems--as part of affinity studies--comes from the science of "nonequilibrium, open-system thermodynamics," a field that studies the complex systems like hurricanes, tornadoes, chemical reactions, life forms, and ecosystems that emerge as "dissipative structures" from the continuous influx of solar energy. Their boundaries are not impermeable and not at equilibrium. Prigogine, the 1977 Nobel Laureate in chemistry for his work on nonequilibrium processes,

writes: "Over the past several decades, a new science has been born, the physics of nonequilibrium processes, and has led to concepts such as self-organization and dissipative structures, which are widely used today in a large spectrum of disciplines, including cosmology, chemistry, and biology, as well as ecology and the social sciences."¹⁴ Open-system thermodynamics are a recent corrective to the closed systems of traditional thermodynamics that reduce the study of energy patterns into a controllable, contained structure (the world as a one-liter box filled with gas--or, if you will, the delusion of Faustian control and closure), whose dynamics eventually reach equilibrium and maximum disorder.¹⁵ Eric D. Schneider and Dorion Sagan summarize Prigogine's nonequilibrium, open-system thermodynamics as follows:

"It studies how energy flow works to bring about complex structures, structures that cycle the fluids, gases, and liquids of which they're made, structures that have a tendency to change and grow. Since you may recognize such structures--you are one of them!--as including life, the science in question can be described as the thermodynamics of life. But actually the science encompasses more than life. It extends to virtually all naturally occurring complex structures, from whirlpools to construction workers. Because the flow systems that seem sometimes to be self-

organized or even miraculous are in fact organized by the flows around them, to which they are open and connected, another name for this science is open system thermodynamics. Technically, open system thermodynamics has been known most often by the imposing name of 'nonequilibrium thermodynamics'--because the systems of interest, the centers of flow, growth, and change, are not static, still or dead; they are not in equilibrium."¹⁶

The patterns of complexity--such as spiraling hurricanes, all life forms (organisms), ecosystems, and, Schneider and Sagan suggest, economic interactions including the flow between city and farm--emerge out of a gradient of difference (in temperature, pressure, chemistry, or quantity of resources, which move like heated molecules dissipating into the cool). As the gradient drives the rush of energy or materials, the system often leaps into new shapes of flow that more readily expend energy (thus following the second law of thermodynamics by increasing entropy) but thereby also increase complexity and even "self-organize"--express affinities--in perpetuating specific flows.

The mechanism for the emergence of the "dissipative structures," as Prigogine calls them, is simply the fluctuations in the flow. These inevitable fluctuations, whether very slight or large, can produce nondeterministic bifurcations (the

unpredictable "leaps" into new orders of flow).¹⁷ In the Forward to Prigogine's Order out of Chaos, Alvin Toffler notes that:

"In Prigoginian terms, all systems contain subsystems which are continually "fluctuating." At times, a single fluctuation or a combination of them may become so powerful, as a result of positive feedback, that it shatters the preexisting organization. At this revolutionary moment--the authors call it a "singular moment" or a "bifurcation point"--it is inherently impossible to determine in advance which direction change will take: whether the system will disintegrate into "chaos" or leap to a new, more differentiated, higher level of "order" or organization, which they call a "dissipative structure."¹⁸

The bifurcation, then, is the moment whose outcome cannot be predicted, and it is the leap into possible complexity which Prigogine terms "creativity" in nature such as the spiraling shapes of fractals images and weather systems. The systems emerge at the bifurcation and then, with continued gradient-driven flows, fluctuations, and positive feedback, can achieve another bifurcation and again leap into ever more powerful or complex systems. Many scientists working in nonequilibrium thermodynamics see these leaps as the possible origins of life and of the mind's structure.

Recognizing this dynamic complexity based on flowing interactions among various open systems driven by gradients of difference and receiving flux from multiple directions (as Sagan and Schneider say: "organized by the flows around them"), provides a perspective that studies the patterns and affinities of the human-nature interface. Prigogine summarizes the potential of this perspective: "We are observing the birth of a new scientific era. We are observing the birth of a science that is no longer limited to idealized and simplified situations but reflects the complexity of the real world, a science that views us and our creativity as part of a fundamental trend present at all levels of nature."¹⁹ An open-systems model thus begins with the assumption that the human-nature interface is part of a continuum of complex, interrelated patterns rather than a question of (absolute) difference. It also suggests, however, that human culture emerges with its own distinctive patterns of creativity that both echo those of nature and that leap into other directions at the nondeterministic bifurcations--in Prigogine's words, the "intrinsic differentiation between different parts of the system."²⁰ Humanity's "intrinsic differentiation" and creativity take many forms, including the Faustian quest to conquer history, myth, and nature in order to "grasp" and control its enabling conditions.

Seeing the intrinsic differentiation via open systems whose enabling conditions cannot be controlled (Stuart Kauffman describes it biologically: "we cannot finitely prestate the configuration space of a biosphere")²¹ should not, however, imply a grand-systems model disallowing cultural differences with another form of monolithic, "phallo-logocentric," imperialistic, and rationalist Western thinking that perceives the world (and all its diverse cultures) in singular, universal, and hierarchical terms. Prigogine comments on the diversity of natural structures with terms he also applies to human cultures: "Our universe has a pluralistic, complex character."²² The complex yet open aspects of the human/nature interface described by Prigogine are destabilizing, but it does not necessarily follow that there is no hope of altering systems. The overt Faustian lesson that we know all too well is, of course, that we can alter our world; the more subtle and significant lesson is that our alterations are part of multiple forces including nature and culture that alter us continually and that take on impressively diverse forms. As Kauffman puts it: "So organisms, niches, and search procedures jointly and self-consistently co-construct one another!"²³ There is, in other words, no dualism of "simple matter" versus "complex culture"; both nature and culture are complex and diverse, and both function within "co-constructing" exchanges. Prigogine provides here an exemplary

type of affinity-studies thinking. Ira Livingston considers this turn towards relationality to be part of the economic development that moves from gold to paper money (this is a major theme in Faust II) and then to "horizontally interaffiliated and outsourced networks" which occurs as "Newton's once comfortingly hard and indivisible atoms, having already been shattered into bits and the bits into dancing probabilistic clouds, are further dematerialized into virtual 'spin networks' of pure relationality."²⁴ Agency takes on a new "spin" here in terms of affinity studies.

This is not the demise of individual agency, however. According to Prigogine, such a view still includes the unpredictable and powerful possibilities of the smallest participants or fluctuations to produce massive alterations:

"We know now that societies are immensely complex systems involving a potentially enormous number of bifurcations exemplified by the variety of cultures that have evolved in the relatively short span of human history. We know that such systems are highly sensitive to fluctuations. This leads both to hope and a threat: hope, since even small fluctuations may grow and change the overall structure. As a result, individual activity is not doomed to insignificance. On the other hand, this is also a threat, since in our

universe the security of stable, permanent rules seems gone forever."²⁵

In Faust, the hubris of individualistic agency explodes on stage with "small fluctuations" leaving massive wakes, even as it is simultaneously undermined by the many other affinities within the play. Goethe's play, in fact, provides an early form of "affinities"; one based on a precarious balance between polarized forces. Faust and Mephistopheles culminate their "accomplishments" with illusions of flooding and then with efforts to dam the sea as if the world were merely the backdrop for their whims. One must contrast these bold acts with Goethe's frequently stated views and practices contextualizing our choices within "nature" and cultural trends. Goethe is famous for seeing human behavior in terms of patterns similar to those in nature. Recent recognition of this fact has led to extensive discussion of his works, particularly Faust, in terms of complexity and chaos theory.²⁶ Additionally, Goethe (in-)famously writes his literary texts as "open systems" of intertextuality woven from so many references and citations to other texts that much of the scholarship on Goethe simply clarifies the sources. The intertextuality of Faust is, one could say, itself a form of "distributed agency," with its typically Goethean composite of many texts, traditions, historical eras, and cultures that shape

it and that are, in turn, shaped by Goethe's writing. Goethe himself called it a "collective effort."

Goethe scholars, in fact, readily assess parts of the play (which was composed over 60 years of Goethe's life) as being a "product" of his "Storm and Stress" period, or of the Enlightenment, or of his scientific works, his reaction to the French revolution and the failed 1830 revolution, etc. Yet they are slower to see Faust the figure as a "product" of many forces instead of a Producer; they thereby perpetuate the Faustian myth of controlling agency. Faust's own delusions regarding his self-determined agency contrast similarly with the text's larger refusal to be isolated from its "enabling conditions." As John McCarthy notes, collective efforts (or distributed agency) can take on astonishing new forms through (Goethean) creativity.²⁷

Turning to the question of agency, I ask in terms of affinity studies: is Faust the powerfully active agent of modern subjectivity, or the hubristically individualistic man intoxicated by witch's brew and "drawn onwards" by multiple forces? Much of the scholarship answers with a clear emphasis on Faust's dominant agency, leading primarily to debates about whether it's a positive or negative force. Martin Swales, for example, describes Faust as the "modern man," leading a "way of life and form of subjectivity that is consistently expressive of modern culture."²⁸ For Swales, Faust is "an intense

individualist, he believes in the authority of his own experience, his own judgments, and is not beholden to received wisdom, to dogma, to shared institutional assumptions."²⁹ Géza von Molnár, similarly, claims that Faust "comes to see himself as a free agent among other free agents on free soil, that is to say on territory wrested from the control of nature and made into a free sphere of human intercourse."³⁰ Others, like R.H. Stephenson and Benjamin Bennett, turn away from the more grandiose vision of Faust, highlighting instead a dialectical view derived from Faust's claim that "Two souls, alas, are dwelling in my breast."³¹ For Stephenson, this is a productive tension based on Goethe's science of polarity; for Bennett, it's the alienation of self-consciousness from the world.³²

There are also notable analyses among those who directly criticize Faust's agency. For example, James van der Laan sees humanity's hubristic belief that we "agents" are in complete control via technology as likely leading to a world that is itself controlled by technology.³³ For Jochen Schmidt, Faust's grand error is to believe in the illusion of progress (ironically suggested by the final ascension) that is undermined with the play's final rejection of the "realm beyond" ("jenseits"), leaving only the senseless and destructive effects here in this realm.³⁴ Kate Rigby rightly brings Goethe himself into the equation as one who may decry the horrible burning deaths of

Philemon and Baucis but also one who celebrates "man's gain of habitable land." Rigby's Goethe is "after all, the inheritor of a tradition from which he never entirely freed himself, whereby the appropriation and domination of the earth by humanity was in some sense preordained."³⁵ Jost Hermand, in contrast, defends Goethe by contrasting his "green world-piousness" with Faust's "false consciousness" gone berserk with a "narcissistic and ego-maniacal drive towards destruction."³⁶ Indeed, Hermand criticizes the critics for their tendency to equate Goethe with Faust and to see them both as primarily positive, self-assertive agents. Hermand's de-emphasis of striving agency with a turn to Goethe's science is fruitful, yet so is Rigby's concern that Goethe himself postulates a Promethean human agency that sees the world as material to be made into our own image. Combining these two views, the open-systems model of affinities reads Faust as a participant in systems that make and are made by their environments.

Goethe himself describes human agency as a "weave": "The weave of our lives and influences is made of various different threads, in that the necessary, the random, the involuntary and the purely desired--each with the most different form and each not often able to be differentiated--delimit each other."³⁷ Indeed, an emphasis on the weave in Faust--rather than individualistic agency--helps explain the tiny scene in Part I:

"Night, Open Field." As Faust and Mephistopheles rush to rescue Gretchen from prison and execution, they pass by mysterious figures in the dark. Faust asks "What are they weaving (weben) there around the raven-stone?"³⁸ It is Faust who poses the question about weaving, whereas Mephistopheles tries to deny any knowledge of the figures by claiming they're witches and shouting "Away, Away!"³⁹ Mephistopheles avoids answering the question about these weaving women who appear like fates, for he is teaching Faust the illusion of self-directed agency. For Jane Brown, Mephistopheles teaches illusion because Faust, she claims, is about "the difficulty of knowing, about the ineffability of truth."⁴⁰ The illusion here, however, is more specific; it is the illusion of controlling the flow and determining both one's own fate and that of others. Gretchen's final moment damages Faust's illusion of power because she both refuses to escape with him and she is "rescued" by a cosmic force, or by the Lord as the "voice from above." Faust portrays the illusions of those in the weave who see only their own unidirectional impetus.

Goethe is not coy with his idea that the weaving "flow" is significant. Faust's conjuring begins with the earth spirit which describes itself as: "An endless flow / A changeful plaiting, / Fiery begetting, / Thus at Time's scurrying loom I weave and warp / And broider at the Godhead's living garb."⁴¹ The earth spirit weaves, the "fates" weave, and even Mephistopheles tries to weave

with illusions; this is Faust's realm where the many flows interact with the ripples of his own influence. Formulating such a "weave" is Taylor's theory of "distributed agency," which states that we need:

"metaphors and concepts that do not rely on the dynamic unity and coherency of agents. And to the extent that such patterns of thought persist because of their resonance with actions in the material and social world, we need different experiences. Or, better, we need to highlight submerged experience of ourselves as 'object-like' or 'distributed,' that is, as agents dependent on other people and many, diverse resources beyond the boundaries of our physical and mental selves. After all, the primary experience of becoming an autonomous subject is not 'raw' experience, let alone uniform and universal experience . . . but experience mediated through particular social discourse."⁴²

Distributed agency--a typical concept in affinity studies--implies that our "human environment" is composed of, and influenced by, other human beings, and "diverse resources beyond the boundaries of our physical and mental selves."⁴³ For Taylor, this de-emphasis of individual self-determination allows for individual agency, but one that is influenced by, and produces effects through, "intersecting processes" of different agents.⁴⁴ Faust, the play, enacts "distributed agency" in its overall

"weave" but also with the weighty implications of its frame of three prefatory texts ("Dedication," "Prelude in the Theater" and "Prologue in Heaven") which provide multiple inconsonant impulses--or, perhaps, inescapable influences on the figures and action--coming from the poet, the director, the merry person, as well as from the Job-like gamble made between the Lord and Mephistopheles (which provides a relevant context for Faust's own gamble). This excessive framing serves to accentuate the plethora of perspectives and influences on the action, and also the fact that this is a play where Faust is a fluid point in a matrix rather than the central will. He acts within multiple larger (and open) frameworks: that is, his movements are "organized by the flows around them."⁴⁵

In contrast to the play itself, Faust, the figure, desires to "grasp" these flows, perceiving nature as "breasts" whose flow he longs to drink: "How, boundless Nature, seize you in my clasp? / You breasts where, all life's sources twain /. . . You brim, you quench, yet I must thirst in vain?"⁴⁶ Failing to emulate the earth spirit and unable to grasp "nature's breasts," Faust instead drinks the witch's brew, seduces and impregnates Gretchen, and then dances with witches, all the while thinking of himself as a destructive "waterfall" in Part I. The immediate link to Part II occurs when Faust wakes up in the "charming landscape" of Act 1, the site where he observes a waterfall and

the resulting rainbow: "So, sun in back, my eye too weak to scan it, / I rather follow, with entrancement growing, / The cataract that cleaves the jagged granite, / From fall to fall, in thousand leaps, outthrowing / A score of thousand streams in its revolving."⁴⁷ The rainbow's significance has been thoroughly debated, yet it is the "waterfall" with its crashing streams that are Faust's motif in the next four acts. In fact, after Faust goes in Act 1 "down" to the mysterious "mothers," Acts II-V all deploy influential female water spirits or nymphs. Thus at the end of Act II, the sirens lure Homunculus to make his final leap into the ocean. They sing: "Buxom Nereids, come near, / Pleasing-wild unto the sight, / Bring, sweet Dorids, Galatea, / Her high mother's image quite."⁴⁸ Once he's leaped, their chorus celebrates with such passion that the entire cosmos joins the song. Act III, then, depicts Helena, Faust, and Euphorion, but the frame is Helena's chorus of women. They first convince Helena to join Faust, and then decide at the end of the act to stay in the realm above and become water nymphs rather than return with her to the underworld. These nymphs proclaim the various powers they shall hold via: growing fruits, water's crashing thunder, water cycling through the land, the trees, and the air, and, finally, the grapes that become Dionysian wines. They are water as agency. In Act IV, in fact, it is the water spirits who help Mephistopheles create the illusion of a flood that defeats the

enemy emperor's soldiers. This flood is another "waterfall," one sent by the "Undines" of the Great Mountain Lake. Mephistopheles notes that this is an illusion, albeit one whose power amuses him: "I can see nothing of these watery lies, / The spell bewilders only human eyes, / I am amused by the bizarre affair".⁴⁹ From the desire for control to the illusion of control: that is the Faustian trajectory.

It is also Act IV where Faust declares his desire to harness the water's power by damming the ocean, since he is annoyed by its lack of "purpose": "On the high sea my eye was lately dwelling, / It surged, in towers self upon self upwelling. / Then it subsided and poured forth its breakers / To storm the mainland's broad and shallow acres. . . ./ There wave on wave imbued with power has heaved, / But to withdraw--and nothing is achieved; / Which drives me near to desperate distress! / Such elemental might unharnessed, purposeless!"⁵⁰ With the damming of the sea in Act V, we have the culmination of Faustian efforts. It is at the moment of deluded technological control over the flow and designation of purpose, as Faust exalts in rapture over the future land and "free people" who might occupy this place wrested from the water's incessant tides (and funded by exploitative colonial conquering), when he collapses into death. The dam itself appears real, not an illusion as was the military waterfall; the illusion here is that Faust can completely control

the water. Mephistopheles says in an aside: "For us alone you are at pains / With all your dikes and moles; a revel / For Neptune, the old water-devil, / Is all you spread, if you but knew. / You lose, whatever your reliance-- / The elements are sworn to our alliance, / In ruin issues all you do."⁵¹

Even Mephistopheles' final glee over Faust's defeat, however, is misled, as he himself is distracted in the end by the burning roses and angelic backsides. The dam represents the grandiose belief in agency that holds back the sea, at least for the moment. Faust is the "waterfall" smashing others even while being pummeled by the tumultuous flows and illusions. Faust is part of the flows, part of the distributed agency, and part of the open systems of affinity.

Using Goethe for an ecocritical exploration of open-systems as part of affinity studies is an obvious choice because he famously describes the world in terms of flowing polarity and the tension between our control and the "elective affinities" which bind and repulse us. Also, Goethe's works inspired some of the pioneers in chaos and systems theory including Prigogine, James Gleick and Mitchell Feigenbaum.⁵² As part of affinity studies, an ecocritical model of open systems looks at flows, boundaries, and agency; it asks how the human/nature interface is portrayed in terms of open or closed boundaries and/or in terms of individual, cultural, or open and distributed agency. Faust reveals how

powerful the illusion of unidirectional control is--it reinforces, in fact, the control we and all organisms have in "environment-making." But it also suggests--despite what Faust himself believes and despite what much of the critical scholarship asserts--that environments or cosmic forces, if you will, simultaneously make us in multidirectional flows.

Goethe's Faust begins with a bargain between the Lord and Mephistopheles, a framing strategy that overtly insists that forces are at work driving Faust far more than he realizes, and the play ends with Faust being drawn passively and inertly as voices sing a request to the "Holy Virgin, Mother, Queen, / Goddess, pour Thy mercies."⁵³ Somewhere in-between the Lord's pact and the eternal feminine's act of drawing him onwards, we find Faust with his "agency" as the possibility of nondeterministic fluctuation, his Mephistophelean gifts, and his acceptance of unidirectional illusions. It is in this in-between that affinity studies place us, as agents individually and yet also as part of distributed agency, as enacting "relations" rather than essences. Goethe similarly focuses on motion and multi-figure engagement in his literature and science. It should not surprise us, then, that the final statement in Faust begins with the famously ambiguous declaration, "Alles Vergängliche / Ist nur ein Gleichnis,"⁵⁴ which has been translated as "All that is changeable / Is but reflected."⁵⁵ I suggest in contrast that

we read it with affinities in mind, thus as "All that is transitory / Is but a relation ("Gleichnis" can mean a brief pictorial tale exemplifying an abstract idea by relating it through a concrete story; it is an analogy, a matter of relating one thing or idea to another). In other words, Faust shares with affinity studies an urgent desire to flee "essences" and individuality as if they were solidly "closed," and to move instead towards perspectives of relationality. Beautiful though relationality may sound in this context, it also presents dangerous tendencies. Affinities are certainly characterized as similarities, relations, and attractions, but they are also described as resulting from being involuntarily drawn together (or "onwards," perhaps, as in Faust's final moment of being drawn onwards by the "eternal feminine": "Das Ewig-Weibliche / Zieht uns hinan"⁵⁶). Faust, the play, successfully portrays the provocative in-between of hybridity as affinity even as its "heroic" figure becomes a caricature of monstrously devouring hybridity as questionably involuntary power.

¹ Hinchliffe, 53.

² Murphy, 35.

³ Smith, 35.

⁴ Phillips, 39.

⁵ Prigogine writes in Order out of chaos: "We now know that far from equilibrium, new types of structures may originate spontaneously. In far-from equilibrium conditions we may have transformation from disorder, from thermal chaos, into order. New dynamic states of matter may originate, states that reflect the interaction of a given system with its surroundings" (12, emphasis mine).

⁶ Plumwood, 9 and 16-17.

⁷ Luhmann, 6-7.

⁸ Luhmann 13

⁹ Ulanowicz, 147. Ulanowicz describes here an open-systems, nonequilibrium study of ecology.

¹⁰ Lewontin, 66.

¹¹ Astrida Orle Tantillo comments on Faust's final ascension in terms of Goethe's science in her recent article, "Damned to Heaven," 2007.

¹² Goethe, Faust, 501-3.

¹³ Goethe, Faust, 3347-3351.

¹⁴ Prigogine, The End of Certainty, 3.

¹⁵ Prigogine comments: "In the classical view, the second law expressed the increase of molecular disorder; as expressed by

Boltzmann, thermodynamic equilibrium corresponds to the state of maximum 'probability.'" Prigogine, From Being to Becoming. xii.

¹⁶ Schneider and Sagan, xii, emphasis mine.

¹⁷ Prigogine and Grégoire Nicolis describe this as follows: "But beyond a critical value . . ., the effect of fluctuations or small external perturbations is no longer damped. The system acts like an amplifier, moves away from the reference state, and evolves to a new regime . . . This is the phenomenon of bifurcation." 72.

¹⁸ Toffler, xv.

¹⁹ Prigogine, The End of Certainty, 7.

²⁰ Nicolis and Prigogine, Exploring Complexity, 74.

²¹ Kauffman, x.

²² Prigogine, Order out of Chaos, 9.

²³ Kauffman, Investigations, 20.

²⁴ Livingston, 153.

²⁵ Prigogine, Order out of Chaos, 312-13.

²⁶ See especially the discussions in McCarthy, Rowland, and van der Laan.

²⁷ See McCarthy's Remapping Reality: Chaos and Creativity in Science and Literature.

²⁸ Swales, 42.

²⁹ Swales, 42.

³⁰ von Molnar, 64.

³¹ Goethe, Faust, 1112.

³² Bennett writes: "Faust is driven to despair, to the brink of nonexistence, by the dialectical operation of the inescapable self-consciousness that alienates us mentally from ourselves in every instant of existence, so that we never truly experience our ideal knowledge of ourselves and are never intellectually in command of our experience." 29.

³³ See van der Laan, "Faust the Technological Mastermind," 12.

³⁴ See especially Schmidt's chapter "Fortschritt als Zerstörungswerk der Moderne."

³⁵ Rigby, 211.

³⁶ Hermand, 48. translation mine.

³⁷ Goethe, Sprüche in Prosa, 373, #6.20.1, translation mine.

³⁸ In some cases, the translation is mine for reasons of clarity. Here, for example, the quotation is from the Frankfurt edition of Faust. Texte. 4399.

³⁹ Goethe, Faust, 4404.

⁴⁰ Brown, 50.

⁴¹ Goethe, Faust, 505-9.

⁴² Taylor, 313. emphasis mine.

⁴³ Taylor, 313.

⁴⁴ Taylor, 327.

⁴⁵ Schneider and Sagan, xii.

⁴⁶ Goethe, Faust, 456-459.

⁴⁷ Goethe, Faust, 4715-19.

⁴⁸ Goethe, Faust, 8383-86.

⁴⁹ Goethe, Faust, 10734-36.

⁵⁰ Goethe, Faust, 10198-10219.

⁵¹ Goethe, Faust, 11544-50.

⁵² See especially Rowland's forward noting that Prigogine himself cites Goethe, p. xii; and McCarthy's discussion of Goethe's influence, p. 176-77.

⁵³ Goethe, Faust, 12101-3.

⁵⁴ Goethe, Faust, 12104-5.

⁵⁵ This is taken from Arndt's translation.

⁵⁵ Goethe, Faust, 12110-11.

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