AN ABSTRACT OF THE THESIS OF

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Title: Knot Theory: In Imitation of Lewis Thomas

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Knot Theory: In Imitation of Lewis Thomas is a collection of 14, 1200-word essays written in the style of Lewis Thomas, a physician who regularly contributed to *The New England Journal of Medicine.* His 1200-word column, "Notes of a Biology Watcher," ran from 1971 – 1980. The resulting compilations collectively received three National Book Awards, and one the compilations, *The Medusa and the Snail*, was the 1980 finalist for the Pulitzer Prize in general nonfiction. His pieces were focused on topics related to science and medicine and were written in the genre of the essay. My background in mathematics and strong interest in the sciences made Thomas an ideal subject to imitate, particularly because Thomas saw science as inextricably intertwined with mystery, human limitations, and finite brains attempting to understand a universe vastly larger than themselves. *Knot Theory* attempts to address many of these issues in a way that honors Thomas and continues the tradition of the essayist while exploring the nature of imitation.

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Knot Theory: In imitation of Lewis Thomas

by
Matthew J. Schmidgall

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APPROVED:

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Matthew J. Schmidgall, Author

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Preface

Imitation is how I admit to what I don't know. There is no pretense in imitation, no pride; there is humility, the willingness to look to another and their work to help shape and direct your own. I've found it's difficult to admit my limitations, to own them, to use them as a means to improve rather than calcify the unknown and unimproved. Even a degree in mathematics, a constant exercise in error and having your mistakes laid bare, does not make this humility more palatable, but reading does, writing even more.

Knot Theory: In Imitation of Lewis Thomas is a collection of essays written in the style of Lewis Thomas, a physician who regularly contributed to *The New England Journal of Medicine*. His 1200-word column, "Notes of a Biology Watcher," ran from 1971 – 1980. The resulting compilations, *Lives of a Cell* (1974) and *The Medusa and the Snail* (1979) collectively received three National Book Awards, and *The Medusa and the Snail* was the 1980 finalist for the Pulitzer Prize. His other works, *Late Night Thoughts Listening to Mahler's Ninth Symphony* (1983), *The Youngest Science: Notes of a Medicine-Watcher* (1983), *Et Cetera, Et Cetera: Notes of Word-Watcher* (1990), and *The Fragile Species* (1992), continued his explorations of topics including etymology, biology, and philosophy.

Thomas addresses science and nature frequently in his writing. As a writer, Thomas invites his readers into a world that often seems closed and mysterious, into the mind of a doctor, a researcher, a human being. In his essays, Thomas reaches back to Montaigne, reaches out to nature, and examines himself, humans, through subjects

that at first might seem mundane. Why a piece of music or an encounter with beavers and otters in a zoo should provoke introspection and wonder is not immediately apparent.

But this is Thomas, and this is part of the value of imitation. As a scientist, Thomas believed in results that could be reproduced by anyone who followed the prescribed procedures. The context might change, the composition of the instruments may vary, but the outcome will demonstrate the same connections within an acceptable margin of error. That margin of error is important; it's important that humans can make mistakes and misunderstand. For Thomas, science was inextricably intertwined with mystery, with human limitations, with finite brains attempting to understand a universe vastly larger than itself. When we read Thomas we experiment with him, we think with him, we imitate his wonder.

Reading is an act of imitation. As we read each word we follow the relationships set by the writer. Our engagement is not limited to imitation, but imitation is where we begin to understand, where we invite the thoughts of another into our own and collaborate to discover meaning. For me, writing is similar. I sit down and attempt to understand myself, to compose the thoughts I've had at any given moment. That's difficult.

Like Montaigne, I find I am inconstant, inconsistent, and unable to remain fixed on any one understanding of my thoughts. Montaigne gets this: "We are all patchwork, and so shapeless and diverse in composition that each bit, each moment,

plays its own game. And there is as much difference between us and ourselves as between us and others. Consider it a great thing to play the part of one single man" (5). From this perspective, writing seems to be a constant act of imitation; when not imitating another, I'm imitating myself, extending the thoughts I had at one moment, even if between sentences, or perhaps the first and second word, my thoughts have wandered away.

Describing Montaigne, Carl Klaus writes, “Montaigne intends his 'roaming,' his 'lusty sallies,' to be seen as an elaborate fiction—as an imitation, rather than an actual replication, of his mind in action” (Klaus 167-168). From Montaigne's perspective, composition, the shaping of thoughts, purposefully molding them so that the reader can follow and understand, might be the most important part of writing.

What we perceive as our identity sometimes gets in the way of that. In "Medusa and the Snail," Thomas noted that "we tend to think of our selves as the only wholly unique creations in nature, but it is not so. Uniqueness is so commonplace a property of living things that there is really nothing at all unique about it. A phenomenon can’t be unique and universal at the same time" (1). I think imitation requires a rejection of the unique and the acceptance of the universal, the shared, the belief that others and their thoughts can speak to you and your own.

Knot theory is a field in mathematics dealing with circles embedded in three-dimensional space. Unlike traditional circles, Knots overlap themselves, fold in on themselves, and are often difficult to unravel or visualize. I've called this collection

Knot Theory as a means to unify my interests in English and mathematics, not just as a student, but as a TA in English and a TA in math, particularly because of one of the primary challenges knot theorists face: determining when one knot is structurally different from another. This is called the "recognition problem." There are many ways knots can be depicted, and it is not uncommon for theorists to find that apparently different knots are actually one and the same. I think English is concerned with the recognition problem, too.

As a math major I grew to love answers, boundaries, concrete connections that could be drawn from concept to concept. The world was firm, fixed, a logic puzzle that just needed the right approach to be unraveled. My experiences with graduate work in English have taught me the importance of questions, of the multiplicity of paths between any given number of objects, and the importance of exploring our relationship to ideas bigger than ourselves.

Yet I can say the same thing about one as I can about the other. Math and English are not so very different, and I think, like knots, they might be different representations of the same thing.

Knot Theory: In Imitation of Lewis Thomas is a collection of fourteen, 1200-word essays written in the style of Lewis Thomas, specifically the essays he wrote for *The New England Journal of Medicine*. My background in mathematics and strong interest in the sciences made Thomas an ideal subject to imitate, particularly because Thomas saw science as inextricably intertwined with mystery, with human

limitations, and with finite brains attempting to understand a universe vastly larger than themselves.

I approached imitation by first attempting to understand the relationships in Thomas' writing. For me, his grammatical structure was less important than his logical relationships—my attempts to do strict reproductions of his grammar and syntax were not successful. Different subjects require different words, some terminology is far more complex, or even much simpler, and attempting to conform those words to a structure created with a different subject in mind is difficult. However, when I kept the logical relationships within and between sentences in mind, I was able to reproduce his moves on both global and local levels.

In order to illustrate imitation throughout this collection I will compare three passages from Lewis Thomas to three I wrote in imitation. The first is a direct imitation where I constructed an essay by doing a line by line imitation of Thomas' "The Tucson Zoo." The second comparison explores how I attempted to imitate certain aspects of Thomas' tone and stylistic choices in his essay "Late Night Thoughts on Listening to Mahler's Ninth Symphony." The third comparison focuses on my attempt to imitate Thomas's use of scientific terminology in a literary setting, particularly his essay "Some Biomythology."

In "The Tucson Zoo," Thomas describes a moment of connection he felt while observing beavers and otters that led him to wonder about the nature of human relationships and social organization. However, in the middle of his essay, Thomas suddenly begins discussing ants and writes:

> Everyone says, stay away from ants. They have no lessons for us; they are crazy little instruments, inhuman, incapable of controlling themselves, lacking manners, lacking souls. When they are massed together, all touching, exchanging bits of information held in their jaws like memoranda, they become a single animal. Look out for that. It is a debasement, a loss of individuality, a violation of human nature, an unnatural act.

Thomas makes a leap here found in many of his essays. Though he had previously been describing his reaction to beavers and otters at the zoo, his move to ants in the middle of his essay comes as a bit of a surprise. The relationship ants have to the preceding paragraphs is not immediately clear, and there's a a brief moment where you might wonder if you have started a new essay entirely, particularly since Thomas begins “The Tucson Zoo” by discussing science as a process of gaining information through reductionism. After a moment of thought this move makes sense—moving from beavers and otters to ants is certainly a form of reductionism. Ultimately, his introduction of ants act as a bridge to discuss human relationships and organization, and, in many ways, is pivotal for understanding the nuances he develops in a limited space.

In my my imitation of “The Tucson Zoo,” “Late Night Radio,” I explored mathematical reasoning and an experience I had listening to a conspiracy theorist on the radio one evening. I describe the strongly negative response I had while listening

to the host discuss the intergalactic ramifications of Voyager 1 leaving our solar system, and I attempted to duplicate Thomas' leap by introducing algebra in the same way he introduced ants:

> Everyone says, stay away from algebra. It has no lessons for us; it is a set of unnecessary skills; detached, not at all useful for living, unable to be applied to the real world, without purpose, without use. When bound up in word problems, massed on an assignment, algebra becomes a vicious adversary, singly intended to trick its practitioners. Watch out for that. It is a deception, a departure from reality, anathema to real world relationships, utterly disconnected.

I found here that making a leap in writing, suddenly shifting topics without necessarily smoothly introducing them, can be useful for developing greater meaning in a limited space. Thomas's leap makes sense: he switches from talking about his connection to beavers and otters to discussing another form of life, ants, and eventually discusses the way ants connect with each other. I made a similar move by moving from mathematical reasoning and how conspiracy theorists misuse induction to discuss algebraic reasoning to how the brain develops relationships between ideas. I think the leap is successful because it encourages the reader to step back from the essay for a moment and examine how the subjects present relate to each other. This

can be difficult for those like myself who strongly tend toward linear, step-by-step thinking.

In “Late Night Thoughts on Listening to Mahler's Ninth Symphony,” Thomas describes how his familiarity with Mahler's Ninth Symphony has been transformed by nuclear proliferation. Thomas was born in 1913 and witnessed the transition from a pre to post-nuclear world, and he describes the effects of the invasive anxiety caused by the Cold War as such:

> Now I hear it differently. I cannot listen to the last movement of the Mahler Ninth without the door-smashing intrusion of a huge new thought: death everywhere, the dying of everything, the end of humanity. The easy sadness expressed with such gentleness and delicacy by that repeated phrase on faded strings, over and over again, no longer comes to me as old, familiar news of the cycle of living and dying. All through the last notes my mind swarms with images of a world in which the thermonuclear bombs have begun to explode, in New York and San Francisco, in Moscow and Leningrad, in Paris, in Paris, in Paris. In Oxford and Cambridge, in Edinburgh. I cannot push away the thought of a cloud of radioactivity drifting along the Engadin, from the Moloja Pass to Ftan, killing off the part of the earth I love more than any other part.

When I read this paragraph I am struck by Thomas' use of tone and repetition. The tension evoked by the subject matter builds as Thomas describes how the Mahler Ninth has been infected by the threat of nuclear war. The haunting repetition of "in Paris, in Paris, in Paris," speaks volumes to how he felt about the city, is itself a "repeated phrase on faded strings," and conveys his attachments clearly. Paragraphs like this are one of the reasons why I found imitating Thomas intimidating at times, and they demonstrate his ability to move from intensely descriptive writing to a poetic structure and back in the space of a sentence, and how combining such different sentences in one paragraph can draw out depth in a short space.

This use of tone and repetition stuck without me throughout the course of my thesis, and my essay "From Perihelion to Aphelion," while not a line-by-line imitation of one of Thomas' essays, was intended to duplicate the tone found in Mahler's Ninth symphony. In it, I discuss time, the eventual fate of our solar system, and the memory of seeing my step-mother the night before she died in order to explore our emotional response to time:

> And there have been an infinite number of years since my father's wife, my step mother, died in 2003. Though so much time has passed, I can remember the last night I saw her, in a hospital bed in their small Corvallis home, the unimaginable sorrow in my father's eyes, and the rise and fall of her chest as she slipped in and out of consciousness. Her body, devastated by cancer and chemotherapy, was in blankets, warm, comfortable, held in my

father's arms as he whispered Tonight might be the last. And it was. And in one night Lisa became impossibly, infinitely, distant.

I remember forever ago, when, at her funeral, my father took me gently to her side. Her once warm body was cold. Pale. Agonizingly present. I remember when he said It's time to say goodbye; you will never have the chance to see her again; she's gone. And I remember when as I lowered my eyes, he said, Goodbye, goodbye, goodbye.

In this excerpt, I attempted to imitate Thomas' arrangement of narrative and imagery. He moves from the sounds of the Mahler's Ninth to bombs exploding over The United States, Russia, and Europe—I attempted to reproduce that by moving to and from infinity, juxtaposed with the memory of watching my father as he lost his second wife.

I found repetition useful here, and I wonder if Thomas, when writing “Late Night Thoughts on Listening to Mahler's Ninth Symphony” felt similarly about “In Paris, in Paris, in Paris,” that saying it once simply did not adequately convey the meaning of the words on the page, that each repeated use digs deeper until that last syllable has a finality that could not otherwise be produced.

One of the main things I enjoy about Thomas' style is his use of scientific terminology. His language is not simplified. It is technical and precise. He was a scientist writing in the New England Journal of Medcine, and in his essay “Some

Biomythology" we can see how this can be somewhat overwhelming at times. He writes:

> There are innumerable plant-animal combinations, mostly in the sea, where the green plant cells provide carbohydrate and oxygen for the animal and receive a share of energy in return. It is the fairest of arrangements. When the paramecium bursaria runs out of food, all he needs to do is stay in the sun and his green endosymbionts will keep him supplied as though he were a grain.
>
> Bacteria are the greatest of all at setting up joint enterprises, on which the lives of their hosts are totally dependent. The nitrogen finding rhizobia in root nodules, the mycetomes of insects, and the enzyme producing colonies in the digestive tracts of many animals are variations of this meticulously symmetrical symbiosis.

Paragraphs like this are dense. Yet the relationships Thomas crafts within them and how he situates them in his essays work toward meaning in a way that invites us to follow along. I may have no idea what paramecium bursaria are, or how endosymbionts aid in their survival, but I understand that Thomas is looking at how organisms depend on each other, how life is intertwined with life, and I'm able glimpse the meaning he is working toward even if I do not understand the science he is describing.

I attempted to replicate his use of scientific concepts and terminology in my essay “Empty Rooms.” My interest in astronomy and how we as humans categorize information parallels his interests in biology and how systems relate to each other:

> Place is a difficult concept to understand. One interpretation is that place is where you are at this moment, the chair you're sitting in, the walls around you, the city, region, country, continent, hemisphere, planet, solar system, galaxy, galaxy group, galaxy cluster, super cluster, sheet, wall, filament—limited here if we discount the possibility of innumerable and unmeasurable universes outside our own. But, as we zoom out, we reach the “End of Greatness,” where no more superlatives can be used to categorize large-scale structures in the universe. At this scale, the universe is considered to be homogenous and isotropic, the same in all directions. Everyone and everything we know is in the End of Greatness.

As I've imitated Thomas, I've noticed we move perpendicularly to each other. With a few exceptions, Thomas tends to zoom in and look at small things, as if looking through a microscopic and seeing how smaller systems can tell us about bigger ones. I tend to zoom out, to look at the things that are much, much bigger than myself, and use them to try to understand the smaller systems around me. I think we, all of us, often employ both of these approaches to better understand our place in the universe around us.

In the essays that follow, I explore a number of subjects. I write about being a TA for both the School of Writing, Literature, and Film as well as for the Department of Mathematics. I explore mathematical reasoning, the teaching of mathematics, the teaching of writing, and, though my topics range from the mathematical conception of infinity to the experience of holding a cat while she died in my arms, I think the essays are all addressing the same knot. The nature of that knot remains open, mysterious—in the style of Thomas.

Two of the essays in this collection, "Late Night Radio and "Early Morning Thoughts," are direct imitations of Thomas' "The Tucson Zoo" and "Late Night Thoughts Listening to Mahler's Ninth Symphony." These imitations are line by line, but not necessarily word by word, recreations of Thomas' structure and style. "CHOICES" and "More CHOICES" were written at another time but have been adapted to the essay form because they work toward a more nuanced understanding of imitation in the classroom. The rest of the essays were written to imitate Thomas' tone and content, and I have found that writing these has illustrated the need to accept my inconsistent self, and explore the idea that my thoughts have never existed in a void.

"It is part of the magic of language that some people can get to the same place by the use of totally different words"

- Lewis Thomas

Late Night Radio

Mathematics arrives at a number of its conclusions through the use of induction, exploring a set of evidence, then the evidence of the evidence, until the underlying pattern, or the pattern of the pattern, is discovered and can be used for making the leap from one problem to the next. Only when a pattern is found can reasoning extend from the original set of evidence to help define general principles. So it goes.

Some mathematicians think we are too presumptuous, reasoning this way. Much of today's incorrect reasoning is a result of determining an incorrect pattern from the given evidence by constructing seemingly plausible, rational structures that fit the particular set of evidence but contradict the greater whole. I had a brief, personal experience with this particular mistake one evening while driving home to Wilsonville listening to the radio. The radio host, a conspiracy theorist, was describing Voyager 1's recent entrance into interstellar space, the first time a man-made object had exited the solar system, and what he believed was a peculiar "scream" from space. The scream, the product of an algorithm that mapped the measurements of ionized gas brushing against the probe's hull to the peaks and valleys of sound waves, aurally depicted the density of particles in the surrounding space and was released by NASA as “the sounds of interstellar space”; for the host, the scream was a warning signal with unknown origin. The scream that was not really a scream, simply a product of a mathematical algorithm created to give the silence of space the illusion of sound, was then described as a sentinel, the watchdog of our

species, echoing across the heavens to an extraterrestrial civilization with unknown intent. Upon its exit from the solar system, Voyager 1 signaled that the human race had departed infancy.

I was perturbed. Even as I look back now, there was only one possible response: confusion mixed with incredulity at such a leap of induction. Unsettled, my mind reeled outward, imagining a massive network of similar beliefs held by otherwise sane, and perfectly rational, people. My cerebral cortex ached and an abiding pain grew within my frontal lobe. I remember thinking, with the part of me that was charged with higher order reasoning, that I wanted no part of the induction of conspiracy theorists. I wanted to never be constrained to the set of evidence and reasons necessary to justify their beliefs; I wished for no surge of empathy, no ability to understand the source and final destination of their theories, their methods for determining underlying patterns, their interpretive frameworks, their paradigms. I hoped never to think of their explanations as the product of valid reasoning. All I wanted was to see their beliefs from the outside, the tools used to shape their theories, the discovery of an incomplete pattern and its incorrect application to a larger system of events.

It lasted, I am happy to say, for only a few moments, and then I was back in my car, limited in my own reason as ever, worrying about induction, but not, at that moment, the induction of conspiracy theorists. Instead, my own. Something worth considering had entered my consciousness. I could not deny that; I would put the entrance somewhere in my cerebrum; perhaps this was higher order thinking at work.

I became a logician, a philosopher, an avant-garde artist, and in an instant I lost my self-assuredness and sense of solid rationality. I was shaken.

But I came away from my drive with a consideration, an insight into myself: I am similar, somehow, to conspiracy theorists. I construct meaning in their presence, when they are describing their thoughts, when they are drawing patterns from limited evidence. I mirror their use of induction. Conspiracy theorists have the capability to interpret and infer, borrowing the terminology of philosophers, and that was precisely what I experienced. What was interpreted? An event. What was inferred? A galactic conspiracy; the product of constructing meaning and finding connections in the face of incomplete evidence. I cannot, from my brief experience, tell you anything more about conspiracy theorists than you already know. Only about me, and I suspect also about you, maybe about human beings at large: we are endowed with minds that construct meaning in the absence of absolute truth, maybe even constructing the notion of truth itself. We are limited, unable to obtain complete knowledge of any one thing, yet make meaning regardless. And the events we interpret, in spite of our limitations, are, essentially, the building blocks for how we understand existence. It is a compulsory practice, and we can no more avoid it than will ourselves thoughtless, stopping inference altogether. Left alone, limited and unchecked, we demand to know.

Everyone says, stay away from algebra. It has no lessons for us; it is a set of unnecessary skills; detached, not at all useful for living, unable to be applied to the

real world, without purpose, without use. When bound up in word problems, massed on an assignment, algebra becomes a vicious adversary, singly intended to trick its practitioners. Watch out for that. It is a deception, a departure from reality, anathema to real world relationships, utterly disconnected.

Sometimes students argue this interpretation seriously and with passionate words. Pursue what is clearly useful, easily understood and obvious, is the mentality. Problem-solving skills, pedagogical terminology for the ability to adapt to unfamiliar situations, are worse than useless, they are a punishment, a vain practice. Only learn what is useful. Do not learn more than you immediately need. But this is an ironic argument when you have to depend on problem-solving skills to make it. You have to evaluate the proposed problem, break it down to its constituent components, determine a potential solution, apply what you know in a new way, and then you have to claim, thoughtfully, rationally, and soundly: do not think; do not make and evaluate meaning. You can't do this and make an effective argument.

Maybe problem-solving is the foundation for all thought, underlying all beliefs, inextricably intertwined with consciousness. Or perhaps it is the right hand of the mind, waiting to be used, ignored now in our educational system as an onerous and unrewarding task. I don't understand why it's unlikely that all human beings have an equal capability to reason, to interpret and make meaning, constructing beliefs in response to everyday events. Adaptability may be the most difficult trait to define, more obscured than rationality, more useful in the long run than logical validity. If

this is the sort of thought education holds for the future, applying to us as well as to algebra, then I am all for the perpetuation of knowledge.

One thought remains: when problem-solving has permeated reason, and is bound up, intertwined, and involved with every moment of thought, and the construction of meaning begins to develop an interrelated network of understanding and beliefs, what on earth comprises validity? And while you're at it, I'd like to know something else: when it does happen, will any single thinker know what's going on? Can the brain be used to interpret itself?

Early Morning Thoughts

I cannot listen to Chopin's 15th prelude, "Raindrop," with anything like the sorrowful reflection and intense reverence I used to experience. When I was younger, I used to listen to the peaceful opening transition into its dramatic interlude and hear the tones of Chopin's life, his brilliant beginnings transformed by life-rending illness, and the concluding notes that signaled the end to his music, the end to his labor, and the culmination of his suffering. I took this prelude as an uncanny autobiography, composed a decade before his death, and saw the progression of his life correspond to each successive note and paint a deeply symbolic picture of illness. I depend on history. The narratives that arise from recorded events are as close as the deceased have to a voice; I used to see those narratives as a foundation for understanding Chopin's life-long struggle with tuberculosis. And always, I have heard his lone piano as an isolated, individual mind, grappling with mortality.

Now I hear it differently. I cannot listen to the lugubrious interlude of "Raindrop" without the demanding realization of historical uncertainty: Chopin's sickness, his lifelong poor health, the disease that murdered brilliance in its prime, may not have been caused by tuberculosis. The progression of his illness and the sudden shift in his health described by the intense transition of the prelude, the raindrops transforming into a storm, no longer come to me as symbolic, representative connections to the years of his life. At the moment of transition, my mind fixates on the present-day assertion that Chopin was struck down by cystic fibrosis, and the clinician recorded the cause of death incorrectly because he did not

understand, could not understand, that his explanation of events did not account for an illness that would not be identified for nearly a century.

I have learned enough by this time to be used to historically incorrect information, sobered by the realization that human beings are limited by the science of the period, but only briefly unsettled, able to recover my faith in historical accounts of the past with the thought that ignorance does not imply incompetence. I have developed and been thankful for, until very recently, a framework for understanding the past that serves me well in times of doubt: we are just as ignorant in the present as our predecessors were in the past: the situations we face are infinitely complex: the mind cannot act on knowledge it does not have. When I face a situation where I am forced to provide an explanation I may find to be similarly mistaken, limited to my own set of experiences, humbled by the unimaginable content of all the things I do not know: in that wondrous moment I stand shoulder-to-shoulder with giants.

Now all that has changed. I cannot think that way anymore. Not while we constantly debate the past, revising history, readily casting aside previous explanations.

This was a bad enough thing for Chopin's generation. They could contend with it, I suppose, because they had no other choice. Time is moving forward, like it or not, and the present will not wait to be fully understood before departing.

What I cannot cope with, what I cannot understand, the thoughts that keep bludgeoning my peace of mind, that have turned Chopin into a great wrecking ball of

uncertainty, are the implications for everything I think I know. How do I know anything that is not immediately in front of me? How can I trust history if even the minor events are subject to change? If I were faced with a continuously changing understanding of the past, I think I would, quite unavoidably, go crazy.

There is a moment near the end of "Raindrop" where the dismal interlude, the stormy account of Chopin's illness, comes to an end and returns to the peaceful notes of the beginning. These final notes connect to the beginnings of his life, as if the storm has passed, and the final notes gently fade, as if returning to the dust of the earth. I used to view this as an important consideration: in the end, the turbulent interpretations of history don't matter, we're all inevitably going to the same place.

Now with a claim in front of me, made by Joseph Atwill, a self-styled American biblical scholar, presented as an ancient confession, an explanation of the genesis of Christianity, claiming that Jesus was an invention of first-century Roman aristocrats, people in power who just wanted their citizens to peacefully pay their taxes, I cannot hear the same "Raindrop." Now, that lone piano in my mind sounds like the resounding destruction of historical certainty and the growing roar of reinterpretation.

If I were a historian, I would not feel the cracking of my own brain, but I would clearly see that certainty was breaking down. I can remember with some clarity what it was like to take courses in history. I was informed about the true nature of Christopher Columbus. I was told that he was not the great and noble discoverer of

the Americas, and he was not even the first European to sail to them, and I began to worry that much of the history I was taught was in error. I had never heard of Chopin, I did not want my suspicions to be confirmed. I was a high school freshman and believed that I could trust the history I was being taught. Certainty was firmly established, not in question. The knowledge I possessed had come from reliable sources, teachers who were interested in my education, and they were the authority on what had come before. It never crossed my mind to worry about what they had been taught; they were the source of knowledge, soothsayers, who told me the things I did not know.

The scholar, presumably a professor at a university, middle-aged and experienced, professional, well-versed in ancient texts, brilliant even among his peers, is demonstrating how the gospels were principally concerned with subjugating the Hebrew people. It's quite obvious, he writes, that “render unto Caesar what is Caesar’s” was intended to control a hostile population. Instead of teaching Jews and gentiles how to let go of material things and focus on something greater, he says, Roman aristocrats, through psychological manipulation, tricked them into paying their taxes. This piece of evidence, he says, is a clear indicator of ulterior motives threaded throughout the New Testament. We can ignore Josephus, and at the same time we can be quite a bit more dismissive and disregard all other interpretations and explanations for this one passage, he says. What about two thousand years of alternative explanations? you might ask. Well, he says. Anyway, he says, human beings are prone to make mistakes, and the ancients did not know nearly as much as

us. Of course, he adds, they were exceptional minds of their time, they had the same mental capacity as we do now, but they did not have access to any of the technology we have today. If they knew then what we know now, there wouldn't be a discrepancy; it's not their fault, they simply didn't know. There are a lot of incorrect interpretations throughout history, and we should guard ourselves against deception, he says.

If I were a historian and I had to listen to that, or read things like that, I would want to give up on understanding the past altogether. I would begin turning my eyes toward the present, the one place where historical certainty is assured, and I would disregard everything that has come before.

Scientists and writers

Lewis Thomas' success as a writer might be related to his success as a scientist and administrator. Mostly, I think the value in his work persists because he was not afraid to bring the less experienced, the less educated, into his world. His essays are windows into the scientific community, and they loudly proclaim that the culture of science should not be feared, that it is not a gated community, but a place where human beings and human experiences gather together.

Reading and imitating several of Lewis Thomas' essays has driven home my tendency toward the bombastic. Thomas' style is even, measured, focused on occasional uses of repetition to convey emotional depth rather than a florid use of adjectives and adverbs. He contrasts his clinical, descriptive language for exposition with a casual, conversational tone to explore complex ideas and relationships. He engages with scientific terminology—zygotes, membranes, cilia, the intricacies of human cloning, the harmonies of Mahler's Ninth Symphony—but manages to create sentences accessible to those without specialized knowledge. This accessibility has nothing to do with an oversimplified use of the terms, nor does Thomas spend his time explaining each and every point; he handles the ideas and relationships with a warmly inviting approach to prose that does not intimidate or off-put a less-informed reader—much like Montaigne. Perhaps very much like Montaigne.

But it's when Thomas handles the less specialized subjects that I find myself deeply drawn into his style. "Late Night Thoughts on Listening to Mahler's Ninth Symphony" was less about global politics or symphonic harmony and more about the

existential dread of powerlessness in the face of insanity. Similarly, “Death in the Open” addresses human mortality by exploring the animal tendency to hide death away and suggests that the ever-growing population of Earth—3 billion at the time of his writing, now 7 billion—will force death out into the open, force us to accept its existence and inevitability, and suggests we will learn to see human death and birth, cessation and replacement, as necessary and unchanging elements of life. In compact spaces, Thomas finds ways to weave personal narrative into concepts so difficult to understand that most of us have a tendency to leave them in abstraction. Thomas does this without tending toward the esoteric; he does not slam shut the doors of academia and hide his thoughts away in high theory or incomprehensibly complex sentences. If anything, Thomas affects an air of warm welcome and humility.

Thomas was an essayist. He didn't write for fame, nor did he write with purposeful obscurity. I think Thomas imitated Montaigne much as I have imitated Thomas. His sentiment toward Montaigne's style parallel my own sentiments: "I cannot imagine anyone reading Montaigne carefully, paying attention, concentrating on what he has to say, without smiling most of the time. It is the easiest of conversations with a very old friend." Maybe this is another result of imitation.

Everyone says, never trust a writer's autobiography; authors write themselves, compose, and sometimes lie. This seems like it would apply mostly to writers of fiction, but I think the nonfiction essayist may be the least trustworthy of all. The writer of fiction might have developed the character of him or herself, but the essayist

has embraced the morphing, slippery self that changes the moment you look away from it.

Researching writers is difficult. The texts you find are more likely to have been written by the writer rather than an account of what the writer did, who the writer was, and how the writer approached his or her labor. This makes sense. Writing comes from the writer's experiences and background; writing never happens in a void. In some ways, researching scientists can be just as difficult. Academic publications are found more often than commentaries on contributions to society. For those like Thomas who have passed away, obituaries are often the only way to understand the human being behind the work. But their writing, the subjects they write about, the way they address the constant process of creation and decay, captures the often muddled motions of the mind.

Regarding Montaigne's work, Thomas says: "you can move through the essays casually, if you like, glancing at the pages as though at the view of the lawn through the window, waiting for something of interest to turn up. And then, 'By the way,' he says, and now you learn forward in your chair, and he begins to tell you what it is like to be a human being."

I don't think Thomas saw much of a difference between "words people" and "numbers people." As a scientist, Thomas pioneered experiments that helped us understand the mechanisms behind disease; as an administrator, he acted as the dean of the Yale medical school and president of the Memorial Sloan-Kettering Cancer

Center; as a writer, he was simply human. Precise, thoughtful, poetic—Thomas explored dying, living in a nuclear-armed world, committees—"These days, with the increasing complexity of the organizations in which we live and the great numbers of us becoming more densely packed together, the work of committees can be a deadly serious business"—and never lost the ability to write in a way that sidestepped bedside manner entirely and invited warm engagement. Thomas was eclectic, versatile, and he focused on sharing the connections he saw with the communities around him.

Mathematicians have a surprising fondness for puns. As I write this, I'm sitting in an office in Kidder, surrounded by math posters proclaiming that "mathematical research is knot what you think"—knots, by the way, are more mathematical than they might seem—and I think I have a glimpse of how Thomas saw the world. He never wore hats. He wasn't a scientist in the laboratory and a writer in his armchair. As I think about it, it might be unfair to even call him a scientist, to call anyone a scientist, to limit their capabilities or assign them specific roles. Thomas was simply curious.

Yang's

Just off Western Oregon University's campus there is a small, popular restaurant called Yang's Teriyaki. I heard about Yang's within the first week of my freshman year of college, and I continue to hear about it when I speak to anyone who spent even a small length of time at WOU. I think the secret to Yang's success, other than low prices and close proximity to campus, is the unique character of their teriyaki sauce: flavors of soy sauce, Worcestershire sauce, and something not quite discernible, a sweetness that gives the sauce its characteristic depth. Once I graduated and moved away, I attempted to recreate Yang's sauce since it wasn't always feasible to make the 50-mile drive.

My first attempt to copy Yang's sauce was based on what I remembered of the sauce and what I understood of how teriyaki sauces are traditionally made. The end result wasn't anything like Yang's. It was not unpleasant, but it lacked the depth and flavor I was hoping to imitate. After my third batch, I started to realize that attempting to copy a product of high quality without knowing any of the ingredients, or the process by which it was made, was significantly more difficult than I originally thought. Each of the imitations only captured a two-dimensional fragment of the qualities that defined the original subject.

While I've been struck by some of the parallels between cooking and writing as I've become more proficient in both areas, the difference between how attempts to reproduce another's work are perceived has been surprising. In the writing classroom, “copying” is a dirty word on par with “plagiarism,” or at the very least, equated with

a lack of originality and independent thought. In “Apologies and Accommodations: Imitation and the Writing Process,” Frank Farmer and Phillip Arrington note that though there are a number of arguments for imitation in the classroom, the arguments themselves reveal a “tacit awareness” that imitation seems to be off the table entirely —that “if imitation enjoyed the blessings of the community at large, there would be little need for any justification at all” (71). Leonard Tourney wrote that “nothing suggests our disesteem for an imitation than the bad verbal company it keeps. Imitations are variously cheap, facile, bad, and mere. They cost less” (4).

The negative connotations attached to the word are difficult to shake, and a number of fields seem to rename the practice entirely. Musicians “cover” songs, scientists “reproduce” experiments, software programmers “reverse-engineer” programs in order to rebuild and improve them—acts of imitation deemed acceptable seem to invariably be renamed as anything other than imitation. I cannot help but notice each of these instances demonstrates that imitation can be a worthwhile, constructive, and interactive activity that engages the imitator with the thoughts and ideas of others. To me, this seems a lot like education.

But it does make me wonder about the subjects of imitation, and exactly what should or should not be imitated. Robert Brooke writes that “when a student (or any writer) successfully learns something about writing by imitation, it is by imitating another person and not a text or process” (23). This makes sense.

I don't think it's unfair to take a similar approach to cooking. Only the owner of Yang's and his father knew the recipe; Yang's teriyaki sauce was the result of their

attempts to mold their experiences with food, culture, and college students into a successful business. The sauce was a product of identity, and if were to recreate their sauce I would need to recreate a part of who they were. I needed to imitate them in order to imitate their creation.

That required a different approach than the one I was taking. While discussing the teaching of composition, Kenneth Roemer cautions that modeling a finished product can be counterproductive and result in an abstract or artificial understanding unless special care is taken to “discourage mechanical and stale thinking” (776). For this reason, many advocates for imitation emphasize imitating the process of creation rather than the creation itself as a means to teach writers strategies for thinking and writing. Ideally, the student of composition would then be able to take the elements most valuable and create something of his or her own but do so in the style of more experienced and proficient writers.

Like Brooke, Richard Lanham sees successful writing as a product of imitating the identity of someone else. For Lanham, the central self is eventually created by “playing at, and with, a great many styles . . . to play with styles is to play with roles, with ways of thinking, and thus, with ways of being” (124). In "Inventing the University," David Bartholomae argues that this activity is crucial for students who wish to gain entrance into academic discourse communities: "what our beginning students need to learn is to extend themselves into the commonplaces, set phrases, rituals, gestures, habits of mind tricks of persuasion, obligatory conclusions, and necessary connections that determine the 'what might be said' and constitute

knowledge within the various branches of our academic community" (8). To become something, Bartholomae might say, you must pretend you already are that thing.

I think cooking is a lot like writing, and in order to become a good cook it seems reasonable to apply many of the same strategies it takes to be a good writer. So I decided to take a different approach to recreating Yang's sauce. I went to the restaurant, ordered a meal, and thought about everything I knew about Yang's as I ate. The ingredients, I decided, were probably local and not hard to find. The grocery stores in a 20-mile radius consisted of a WinCo and a Roth's. The process of making the sauce couldn't take too long—the business was small and they went through sauce fast enough that I couldn't imagine an aging process that would require a lot of storage. And, as I ate, I finally identified the flavor I had previously been unable to place: molasses. When I had first attempted to recreate the sauce I had a limited set of experiences to draw on, and the idea of using molasses in a teriyaki sauce would have never occurred to me. For the briefest of instants, I stopped thinking like me.

After I realized the preconceptions I had about what constituted teriyaki sauce were not helpful, I took several containers of Yang's sauce with me as I left, and I went to the two grocery stores in Monmouth to prepare. I picked the cheapest and most available ingredients I found: molasses, Worcestershire sauce, soy sauce, mirin, and ginger root. When I began cooking, I tasted the sauce I took from the restaurant, added several of my ingredients to a pan, tasted the sauce again, and spent half an hour perfecting the ratio of ingredients over low heat. The end result was a sauce that was difficult to differentiate from the original—I had reproduced the original by

adapting practices suggested by Brooke and Lanham, and had attempted to use imitation as a process while keeping the subject of imitation firmly in mind, revisiting it frequently as I produced my own work.

Good writing, I think, is a lot like Yang's sauce.

Choices

The first ten years of my education can be described as a tumultuous foundation for my development as a writer. I hated being in classrooms of any sort, and I would skip school as often as possible so that I might minimize the amount of time spent staring at my desk waiting for the bell to ring. The lack of any sort of structural freedom or serious interaction with the material left me frustrated and bored —there seemed to be little sense in paying attention in an environment that justified its own authority simply by being authoritative. Instead, I stayed home and read books of my own choosing, thinking my own thoughts and imposing my own structures. Eventually, school administrators became aware of my somewhat less than subtle absenteeism and decided placing me in an "alternative education program" would correct what they perceived to be a fundamental flaw in my attitude toward school. Consequently, for my seventh grade year I had no choice but to attend a ten-student alternate education program called "CHOICES."

My experience at CHOICES marked the first time in my life I was exposed to truly alternate education. Rather than the crowded madness characteristic of public schools, CHOICES consisted of 10 students and 2 teachers, stressing community interaction and self-direction over an authority-dominated learning environment, fitting neatly into James Berlin's notion of social epistemic rhetoric. As hinted at by the name of the program, CHOICES emphasized education Berlin would describe as a way for students to "identify the ways in which control over their own lives has been denied them, and denied in such a way that they have blamed themselves for

their powerlessness" (680). Like myself, many of my peers were public education's rejects, those who Berlin would say were "systematically denied" opportunities for "self-discipline, self-organization, collective work styles, [and] group deliberations" (680). We were those who responded to ideological oppression by refusing to participate in any prescribed discourse community, and, as a result of our unwillingness to accept a dominant ideology, were forcibly enrolled in an "alternate" program. Ironically, the program operated in such a way as to provide us the tools necessary for understanding and opposing the very ideological forces of the public education system that had placed us there.

My growth as a writer in this program can be ascribed to the social-epistemic atmosphere and the activities that were geared toward each of the students. Many of the backgrounds represented in the program consisted of gang-related activity and familial substance abuse, environments that had a deep impact on the natural response to any sort of authority or institutionally imposed set of behaviors. As many of the students in CHOICES came from dysfunctional familial and social backgrounds, a strong focus was placed on critically examining our root environments and developing independent thought. Writing was used as a tool to explore personal and ethical conflicts in the context of our respective cultural influences. Better yet, we thought through and approached these issues as a community of learners facilitated by our two instructors.

Though Robert Hillocks found that free-writing is "less effective than any other focus of instruction" in "What Works in Teaching Composition" (537),

CHOICES focused on using the practice in support of the educational focus of the program. Instead of forcing us into a system of rules and procedures that we were expected to adapt on our own, an approach that Hillock describes as counterproductive toward producing effective writing (540), CHOICES approached writing as a process holistically related to our environmental stimuli. In this way, the program fostered an approach to critical thinking rehearsed through the act of writing. This emphasis allowed many of us to return to the public education system and adapt to its environment while, as Berlin would say, "resisting those social influences that alienate and disempower, doing so, moreover, in and through social activity" (Berlin 681). After all, that sort of resilience had to be fostered for those who would be returning to lives influenced by gang culture and addicts whenever they left the classroom. I was, fortunately, spared those particular trials, but I benefited from the program nonetheless.

The benefits did not immediately appear, however. In fact, my return to standardized education the following year can only be described as disastrous. I had grown use to the freedom allowed in the CHOICES classroom—the ability to interact with class concepts on my own terms was still harshly discouraged in a public education setting. I immediately encountered the same tension I experienced before my placement in CHOICES. My attendance was once again dismal. This time the school administration either did not notice or did not care; not as much as a letter was sent to my parents. At this stage, school administrators may have exhausted their options, opting to pass me on to the district high school and hope for my success in a

new setting. When they finally did notice, my guidance counselor arranged a meeting to figure out what I would do since I would "obviously never be able to complete a college degree." At the time, her words were devastating. Now, as I'm completing my master's degree they seem hollow, alien, entirely devoid of meaning, a cultural influence CHOICES taught me to resist.

I've resisted the destiny she predicted ever since. Following high school, I completed a bachelor of arts in mathematics and graduated with honors. I didn't realize it until my first year of graduate school, but when I entered college I was an ideological refugee. A significant portion of my education was a concerted campaign to indoctrinate me into particular ways of approaching learning and writing, always willing to penalize me for differing from the standard.

As I have developed as a writer and teacher of writing, I have become increasingly aware of the ideological taint seeping into my classroom practices due to my previous experiences in education. Like a child haphazardly attempting to avoid becoming like his parents, I have been forced to accept that many of the traits and practices I found less than desirable as a student have wormed their way into my pedagogical approach. But I still have choices, and I can still resist the influences I find problematic, even if that means resisting myself.

Enigmas

I can't quite say when it happened, but sometime between being accepted to a graduate program in mathematics and returning from a bridge program at Texas A&M I had a change of heart. The idea of spending the rest of my life working with an esoteric system of symbols and reasoning wasn't terribly exciting—I had a hard time understanding how doing math could improve the lives of those around me.

I studied number theory, specifically cryptology, the science of secret codes. I created my own ciphers, attended conferences, received awards, and felt an extraordinary sense of pride when I was inducted into Pi Mu Epsilon, the math honor society. Though I was not the next Andrew Wiles, I had a potentially bright future ahead of me.

That wasn't what I wanted, though. I wanted to teach, and I didn't want to teach my students how to create logical structures and tie them together for no immediately apparent purpose. I wanted to give my students skills that could be used to directly improve their lives and the lives of those around them. Pure mathematics is not necessarily suited for such an endeavor.

On my flight back from Texas, I sat next to a high school English teacher. He was reading Livy in the original Latin, and we struck up a conversation. Texas, he said, wasn't his favorite state, but it was his favorite state in which to teach: cultural identity is important, and the role an English teacher can play is vital. Hearing about his experiences teaching English triggered my natural tendency to tie structures

together, and, on the rebound from mathematics, I found myself drawn to rhetoric and composition about 30,000 feet above the state of Colorado.

There is anxiety in making such a switch. To cope, I had to synthesize my experiences with rhet/comp and math. The two fields, I found, were in no way diametrically opposed. Rather, one could see the writing of proofs as a pursuit of identification; the symbols and laws of logic directly analogous to grammar and conventions. Each math problem produced a rhetorical situation—or perhaps was produced by such a situation—and in many ways Math is like writing: I discovered I had, in fact, received a degree directly related to the field of rhetoric and composition

The anxiety returned when I was accepted into OSU and attended orientation to be a Graduate Teaching Assistant for the English department. There comes a bit of an existential crisis when a 23-year-old with a Bachelor's degree in mathematics realizes that he's going to be teaching a course in freshman composition in less than a week. I think anyone about to teach for the first time experiences that crisis.

I have no doubt that many of my peers felt just as anxious about teaching. There are a few questions that I think are pretty common. “Am I qualified to be teaching at a university?” “How did I manage to trick these people into offering me an assistantship?” and, of course, “What will my students do when they find out I'm a fraud?” As I recall, the night before the first day of teaching seemed to have an atmosphere more commonly associated with a hospital ward than a university.

I expressed my concerns to several of my professors. I was worried, I said, that my lack of a formal background in writing and English would prove disastrous in front of my students, that I would have a difficult time getting them to respect and listen to me when I didn't even have an undergraduate degree in the humanities. After speaking with several of them for some time, I realized I was continuing to see mathematics and composition as separate areas in my mind, creating a distinction that was only serving to point out areas in my education that were either undeveloped or nonexistent.

Oregon State University, as my professors pointed out, has a large number of engineers. Engineering has a heavy focus on mathematics, and many of my students would have either a strong background in mathematics or at least a significant interest in the field. I had an edge that many of my peers did not: I could connect with my students in their own territory, using their own language, and position myself in multiple levels of seniority. The simple fact that I was their instructor would accord me with a certain level of respect, simply by virtue of being “the teacher,” that could be supplemented rather than supplanted by my background.

As it turns out, engineering students tend to have their own anxiety when it comes to writing. Many of them believe that they are not good writers, that their talents lie in math and science rather than in writing or the liberal arts. This lack of confidence became apparent during a week of required conferences when a number of my students would first say, “I'm not a good writer” and quickly follow it with “I'm a

lot better with numbers" as if one is either a numbers person or a words person, but never both. Though I tried to use myself as a counter-example, most students deflected that and called me an exception.

I'm not.

One of my favorite memories from teaching WR 121 was helping one student by relating paragraphs to math problems. The topic sentence, I told him, acted as the problem statement. The concluding sentence was the "answer." As with a math problem, there should be a clear sequence of logical and legible steps from the problem statement to the written solution; there should be no sudden leaps in logic, and each sentence should follow from the previous and lead into the next.

I then described how the paper as a whole is organized in much the same way, with the introduction and conclusion taking the place of the topic and concluding sentences respectively. Each paragraph should follow from the previous and lead into the next in a sensible fashion that draws out the rationale of the paper and clearly works toward the intended "solution."

Essays, I might add, are different than academic papers.

Though the analogy was on the spur of the moment, he seemed to understand the underlying concepts I was describing and began to implement them in his writing. Though he still struggled with paragraphs, his organization steadily improved over the course of the term.

At this point, I see my experiences with mathematics and composition as an ongoing conversation, and I'm finding they are both members of a much larger conversation with a greater number of participants than might be immediately apparent.

Limits

The orientation I attended in order to teach mathematics as a teaching assistant at Oregon State University taught me to fear the equal sign more than the sum of my previous experiences as a math major. As notation, the equal sign seems quite simple: two given objects are the same, not similar, but precisely the same; the left hand side and the right hand side of the sign are in no way dissimilar to each other. If they appear different it is only a trick, an illusion, one of the many games of mathematics but nothing more and nothing less. Equality does not imply approximation nor estimation, but indicates that two objects are identical in every way, shape, and form. As a general rule, college freshman have a habit of using the equal sign to signal the next step in their thinking without giving due consideration to equality.

The seriousness of this bad habit was not apparent to me until those of us being trained as teaching assistants presented mini lessons to Dr. Tevian Dray, a professor of mathematics at OSU and a seasoned teacher. Our task was to communicate an assigned mathematical concept clearly and effectively in ten minutes. The young woman who volunteered to go first was tasked with demonstrating how the chain rule can be used to find the derivative of composite functions, and she happened to write $y = \sin(x^3 + 1)$ was equal to $^{dy}/_{dx}$, accidentally stating that the function was equal to its own derivative, a feat only possible for e^x. The mistake was simple but costly. Dr. Dray excoriated her misuse of equality, reminding all of us that students needed as much help as they could possibly get; every mistake we make on the board will be copied into their notes, shared with

classmates, studied before midterms, find its way back to us, and will be penalized for being incorrect. In turn, students will be discouraged, disillusioned, and disenchanted with mathematics and will consider themselves less "math smart" than their peers. The grammar of mathematics, he said, is absolutely vital, and our misuse of the equal sign results in a measurable inequality.

The language of mathematics is dense and difficult to describe without using notation. As an example, with notation I can say the definition of a derivative is

$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}$$

Without notation I would say, "the derivative of a function, *f,* with respect to the variable *x* is equal to the limit as delta *x* converges to zero, of *f* of *x* plus delta *x*, minus *f* of *x*, over delta *x*." And there is some ambiguity here: using notation we can see which terms are in the numerator and which are in the denominator, but when we describe this without notation there is the possibility of mixing up which terms go where, dividing only one of the terms in the numerator by the denominator, or even misidentifying the terms altogether. This problem can be remedied by adding additional words that allow us to indicate which terms go together and where, but then meaning that was described by a simple equation requires a paragraph to accurately convey. At this point mathematics is no longer dense and is on the verge of becoming just as confusing to someone who simply does not understand the notation.

So notation is important, and accurate notation is even more important because it is used to communicate a complex series of finely-tuned relationships.

But equality is the simplest relationship that can exist between objects. When I ask my students whether

$$\frac{x^2 - 2x - 8}{x - 2} \stackrel{?}{=} x - 4$$

I'm asking them if the left hand side is equal to the right hand side, if the given objects are actually just one object represented in two different ways. I am not asking them to show that the left side has caused the right side, or that one object can be inferred from the other through esoteric arguments and mental gymnastics. If they try a few examples, they might say yes, the two are equal to each other. They might even go so far as to say $x - 2$ factors out of the numerator leaving only $x + 4$ on the left hand side, but this is dividing by zero in the case where $x = 2$, and is therefore not allowed. The equal sign is trusted, it has a certain credibility, and is sometimes difficult to question much less use.

I have found that one of the most common challenges in teaching math is convincing my students that their assignments are not trying to trick them. This task seems particularly challenging when teaching limits and their relationship to derivatives as an introduction to calculus. After exploring the previous problem, I asked them to show

$$\lim_{x \to 2} \frac{x^2 - 2x - 8}{x - 2} \stackrel{?}{=} \lim_{x \to 2} (x - 4)$$

several were immediately dismayed. We had just shown that the two functions were not equal to each other, so why would their limits be equal to each other? You can't divide by zero. Why was I blatantly trying to trick them? Even those indifferent to the danger of dividing by zero wrote "a number divided by itself is equal to one, but one is not equal to six." So the equality was wrong to begin with, I was just trying to trick them, and, boy, did they catch me.

This is understandable thinking. Expected, even. Math problems are purposefully written to develop a nuanced understanding of logical relationships. Limits are different than functions. That's the nuance I was trying to teach through these problems, but the bombardment of problems that serve to confuse students who are not correctly applying the rules has led to the unfortunately common belief that math problems are deceptive, math teachers are bullies, and even worse, an underlying suspicion that instructors are just incompetent and constantly make mistakes when writing problems in the first place.

I think Dr. Dray knew the challenges we would face as freshly minted teaching assistants. Though we all earned undergraduate degrees in mathematics and jumped through the same hoops and faced the same challenges as our students, our role has shifted from victim to perpetrator. We are no longer in a position where a mistakenly placed equal sign will be penalized by a small deduction of points; as teachers of math, our mistakes increase in severity with every additional student we

mislead, and we may unintentionally contribute to the widely held belief that mathematics is an unpleasant exercise in obscurity.

Sometimes I wonder how math departments maintain morale among their instructors. Between being terrified of making a mistake while teaching and having to simultaneously contend with students who are convinced that nothing is as it seems and everything is made as hard as possible, there isn't a lot of space to breathe.

And I am beginning to understand why so many people don't like math. Students and instructors alike.

More Choices

As may be the norm, the classroom environment in high school is often very similar to middle school, particularly when both schools are a part of the same district. When I returned from CHOICES, I rejected the structure I found myself once again involved: strict and unyielding curricula with larger class sizes and even more of a one-size-fits-all approach to education. In a high school with well over a thousand students, which incorporates both Advanced Placement and International Baccalaureate programs, and I quickly found becoming disconnected from the classroom was as easy as laying my head down and closing my eyes. After all, when a classroom has upwards of fifty students a social epistemic atmosphere like that of CHOICES is simply impossible—an authoritative and depersonalized dynamic seems to be the only way a teacher can stay both healthy and sane.

My flagrant and resurging truancy was noticed midway through my sophomore year of high school. My guidance counselor realized I was failing nearly every class I was taking and was on a rapid path to becoming a high school dropout. There were meetings and discussions, and at the request of someone who had my best interest at heart, I was eventually placed in a class called “personal empowerment” that recreated the community-focused and generative approach to education I found in CHOICES. Only when I encountered a similar environment to the one I experienced my seventh grade year was I finally able to put the skills I had developed fully into use.

Though the course had no specified writing component, the instructor encouraged using writing as a means of examining one's self in terms of personal context and external environment. Similarly to CHOICES, heavy emphasis was placed on personal identity and voice, affirming a students' ability to affect change in his or her circumstances. Though I had been choosing to embrace inaction, in effect systematically denying myself those opportunities for self-discipline, self-organization, collective work styles, and group deliberations, writing served as a means for me to reclaim a sense of agency in a powerful way. The opportunities for reflection and expression allowed me to quite literally perform self-revision. Examining my own lines of thinking caused me to reject the ineffective and synthesize new ways of affecting social change, both internally and externally, giving both my voice (and my writing) purpose and power.

The awareness that I had this capability kindled an ongoing exigency that motivated a radical shift in my education. I began to take my studies seriously, and, with a great deal of effort and support from both teachers and staff of the system I once loathed, pulled my academic career out of the near-vertical nose-dive it had become. In the end, I was able to graduate from high school with the rest of my peers, receive a degree in mathematics with honors from Western Oregon University, and I am currently completing an MA program in rhetoric, writing and culture at Oregon State University. The role writing played in small community-based settings has impacted my life personally and professionally in a way I will never forget.

Though my experiences in secondary education have had a strong and lasting effect, perhaps the most radical change in my approach to how I view writing took place within the first five weeks as a Graduate Teaching Assistant for the English department at Oregon State University. As a new teacher, I was very excited by the prospect of seeing my students progress from raw freshman to more mature writers ready for all of the challenges associated with collegiate level courses. To this end, I carefully responded to each of their assignments for the first few weeks of class, providing as much input as I had time to spare. I was excited to see how their writing would develop by their first major essay.

Unfortunately, I was not prepared for the actual quality of work submitted by a number of my students. I could not understand how almost half the papers turned in had undergone no appreciable revision from peer review to conferences to final draft. The improvement some of my students demonstrated was completely overshadowed by what only appeared to me to be an assassination attempt via student apathy and disregard. For some time I was unable to shake the feeling that nothing I had said mattered.

But that was exactly my mistake: I had told them what they had done incorrectly, walked them through the right way to resolve certain problems, but had not set aside time for them to practice doing so themselves; there were few activities that gave my students a clear opportunity to put the concepts discussed into practice in a community-based setting. Approaches Hillocks found to be least effective—grammar review, models, free-writing—reigned as the dominant practices in my

classroom. I was humbled by the sheer number of assumptions I had made about how my students learn without in any way critically examining their efficacy. Though such exercises can be used to great advantage in the right environment, my classroom atmosphere was not tying any of the individual components into an overarching whole, the strength that characterized CHOICES' and personal empowerment's environment.

Unfortunately, I had allowed ineffective ideology to dominate my pedagogical approach. As Berlin might point out, I had essentially propagated a dictatorial agenda that sought to limit student expression and stunt intellectual exploration. Parallel to Lindemann's discussion of form in A Rhetoric for Writing Teachers, I had allowed my interaction with previous pedagogical approaches to produce a limited-form consciousness of teaching (131). My classroom structure reflected the organization and conventions that had been so often imposed upon me in public school—I was not incorporating my students and their voices into the classroom environment, and, as Hillocks might suggest, I did not step back and ask myself which practices were empirically effective. Perhaps worst of all, I disregarded my experiences with CHOICES and Personal Empowerment, and I perpetuated an approach to education that had not in any way worked for me.

In my mind, teaching has to take place in terms of an active-interactive pedagogical approach. Though I cannot take as open-handed an approach as advocated by Berlin's social epistemic rhetoric due to current class sizes, I can still incorporate many of its elements in order to further involve my students in the

development of their writing process. Effective writing is engendered by a structure that allows for originality and creativity while still providing a framework for orchestrating thought in terms of rhetorical exigency; effective teaching is defined by strategies that help students develop such a process. As I have learned, writing is not improved by simply hearing abstract theory: writing is learned through focused activities that allow students to freely apply the concepts and techniques that are presented within the classroom to their own lives and environment. Writing, after all, cannot be seen in terms of just the self or just the society. Writing is an activity that binds the two together.

The Quiet Game

While I was carving pumpkins with my girlfriend's family, her grandpa made the remark that the only mail he ever gets anymore is junk mail. The statement was innocuous, simple, but it has remained fixed in my mind, and the questions it raises have demanded my attention for several days now.

Junk mail is interesting. The envelops presume familiarity; they enter into private space uninvited and request the same amount of attention as you might give a letter from the bank or a long-friend. But junk mail has nothing to offer. It is of no value, and any amount of time and energy invested into opening it is lost, never to be regained.

Snail mail is not commonly used to keep in touch these days. The United States Postal Service's ongoing shortfalls are an indicator that most of our communications and correspondences take place through email, text message, or other digital avenues. Writing or typing out thoughts, putting them into a paper envelop, and then waiting several days for the message to arrive seems unnecessary, out of place, a relic of a bygone era. Why not send a message that requires no paper, minimal delivery time, and does not require knowing where the recipient lives? Doesn't it only make sense that her grandfather would no longer be receiving meaningful mail in his mailbox?

The following day, Nikki's sister posted on Facebook that while the carving party was a fantastic success, it was missing the greatest Funk family tradition: the

Quiet Game. The rules of the Quiet Game are simple: gather a large group of people in a small room, turn off the lights, and see how long everyone can go without talking.

Everyone talks.

The game can be frustrating until you figure out that it is never intended to be taken seriously; most of the fun comes from knowingly breaking the rules, the thinly veiled anonymity of darkness, and how the adults present break the rules more often than their children. Comments made in the dark, some off-color, others confused, fill the space with familiarity, and, after just a short while, it becomes apparent that the Quiet Game is about being in an unfamiliar situation with those whom you are close and sharing in it together.

Nikki says that most of the core people who used to play the quiet game are gone now. While the pumpkin carving party used to involve only immediate family members with one or two new people, recent years have seen many new people coming. The quiet game no longer seems fun, she says, and now it only serves to create a familiar situation with unfamiliar people, and, as a result, has lost most of its appeal.

Another thought has occurred to me, recently. I wonder if her grandfather's statement was much less innocuous than I originally thought. His wife passed away just under two years ago, and a great deal of his friends and family preceded her. He is 83 years old, and he is the oldest living member of Nikki's extended family. The

next oldest is his eldest son, and he is 61 years old. Following him are his children's husbands and wives, his nieces and nephews, grandchildren, great grandchildren, and distant cousins. Most of his interpersonal connections exist within the Funk family tree, and most of them are several decades, if not well over half a century, removed, and it occurs to me that as the snail mail generations dwindle, so do their letters.

I think the real horror of death is not found in contemplating your own. Though frightening, you eventually realize that you cannot imagine what the end of your life will bring, and any fear you have is just that of the unknown. Scary, yes, but not the most terrifying aspect. The true terror comes when you realize that everyone else is going to die. Your friends, siblings, parents—the foundation of your life—will slip away, and every following day will serve as a stark reminder of their absence. That is not the unknown. The death of a loved one is frighteningly easy to imagine, and the thought of continuing to exist without them is hard to bear.

It can be said that we belong as much to the people around us as we do to ourselves. We are known by what other people say about us, described in terms of the impact we have on others' lives, remembered by the stories told about us more than the relics we leave behind. We are memories removed from our own brain. The hidden space in our mind, the place we often consider the seat of our true self, dies with us; the stories that stay behind define who we were and how we are remembered. So when someone we know, a keeper of our stories, dies, we die, too, and as we age we will die over and over again.

Here, death can be seen differently. Life changes. Snail-mail changes. Culture continues onward; not indifferently, more like a busy professional wishing more time, any time, could be set aside for the departed, but it doesn't stop, cannot stop, and eventually we will be left behind.

Sometimes I imagine what my life will be like when I am 83 years old. Though I'm sure I will miss many people, I wonder what it will be like to live in an age when most of my memories are of a world that has long since moved on, now filled with strangers all going about their business, living lives removed from my own. I imagine what it will be like when I no longer get any texts from people I know, only junk, only ever junk, and what I might say while carving pumpkins with my granddaughter's boyfriend, what I might say about my mail, what he will hear and where his mind will wander. Seeing this future is not as difficult I might wish, but in it death feels less alien, less unknown—less strange than the empty world around me.

I wonder if her grandfather feels much the same way. I wonder if he feels like the simple familiarity of his mailbox has transformed over the years into something altogether unfamiliar; no longer holding important messages from his loved ones, his parents, his wife, it is now filled with meaningless letters, reminders that so much has changed. And I wonder if he, too, thinks about death. And I wonder if it feels less alien. Less unknown.

Ten Minutes

Last night, I held a cat as she died in my lap. She had been healthy and well the day before: irritable, confrontational, violently psychopathic—her typical self. Sophie was not my cat. She belonged to my girlfriend, but had been inherited by her mother, Brenda, after Nikki moved away to go to college—Sophie had been part of their family for over thirteen years and had seen many changes. She wasn't my cat, but she died in my lap, quietly, without any of her usual aggression.

Brenda's cats are not inside cats. On very cold nights she opens the cat-door to the bathroom and lets them come into a closed, insulated section of the house. The bathroom is warmer than outside but still cold, and the cats are aware that the rest of the house is warmer and drier. Occasionally, they will take advantage of a cracked door, run into the house, and eventually be caught and put in the bathroom again. I'm sure the warmth of the house must seem like paradise to them, the bathroom a sort of Purgatory, in between the yearned for warmth of the house and the dreaded, biting snow outside. I feel like a warden when I catch the escaped cats and return them to their cell. With cats, it's easy to feel this way.

Brenda had a special place in her heart for Sophie. About a year previously, the dog of a guest staying at her house escaped from its cage and began attacking her cats. Sophie fell fifty feet from a tree but still managed to escape; the other, Kita, did not. Brenda watched as her cat was mauled in a matter of seconds, and when she

finally got the cat away from the dog, from Bear, felt guilty by how relieved she was that it was Kita, not Sophie, who had been killed.

The owners of the dog, Bob and Alice, were homeless before Brenda took them in. They had been squatting in an unsold home for weeks without electricity, heat, or running water, and, when Brenda found out, she did everything she could to provide a home for them. There was a bond, here. Bob used to work for Cascade Auto Wrecking, the business Brenda's husband, Dale, used to own before he passed away in 2004, and the time spent working for them had earned Ferrell trust. So Brenda opened up Nikki's old bedroom for them to stay in and gave them a home for as long as she could so they could get back on their feet.

Sophie was a link to the past. She belonged to Brenda, Nikki, and Dale, and was the last pet alive that knew Dale before he passed away. She was the last pet that Brenda and Dale bought for Nikki, and she witnessed their time together as a family, the unimaginable loss they experienced when Dale died, and changes in the household as Nikki moved from high school to college. It makes sense that Sophie hated everyone but Brenda.

We would later find out that Alice was addicted to heroin and Bob was an alcoholic. Brenda's liquor cabinet disappeared, little things around the house began to go missing, and the two seemed to always be distracted by some intangible thing. But there seemed to be good, too: Alice offered, with the help of her friends, to help dismantle a junked RV leftover from Cascade Auto Wrecking. Brenda thought it would be win/win—the RV was an eyesore, and she didn't have the means or

equipment to remove it. Several days later, the RV had been scavenged for every piece metal and electronic device; all that remained was a heap of plastic and unsalvageable material. Nothing had been cleaned up, the problem was worse, and evidence of nearby human defecation added insult to injury.

Bob and Alice had a ten-year-old son. When Brenda found out that a ten-year-old boy was being forced to squat with his homeless parents, she opened up Nikki's old room and attempted to make it as much of a normal home for him as she could. She knew, we all knew, his parents had a problem. Visits to the bathroom that lasted for hours and hours, the inability to store alcohol longer for any length of time, late night visitors and evasive answers; explanation upon explanation for every single damaged object and missing dollar.

It was around the time strangers started showing up asking about Alice that Brenda's children stopped letting her grandchildren come over, and after several months it looked like Bob and Alice were no closer to getting back on their feet than on day 1. Their son had a home, but Brenda's was being ruined around her.

And eventually Bear, the dog that Bob and Alice had nowhere else to put, dug out from his cage and killed one of her cats. Nikki's cat. A cat that had been brought into the room Bob and Alice were staying in countless times before they took it over to be loved, brushed, and overfed. Brenda's relief that it was not Sophie quickly faded.

Bob and Alice seemed to realize their credit had run out. Alice disappeared, and Bob, with the promise of work, made arrangements to move with his youngest son to his brother's in Oklahoma. Kita was gone, but Nikki's room was her own, and Brenda's grandchildren started coming over again. Occasionally they'll tell stories of a dirty woman living in the woods nearby, but their stories are always changing—just one more bogeyman.

Each year, Sweet Home holds the “Sweet Home Singing Christmas Tree.” The city's residents build a large Christmas tree set, and a choir stands on each level of the Christmas tree singing a mixture of secular songs and religious hymns. Brenda has been a part of it for years and, for the last month, has been going to the nightly rehearsals with one of her granddaughters. The Singing Christmas Tree is as much a family tradition as it is a Sweet Home tradition, and Brenda has made a point to be involved and attend every year.

This year, half an hour before they left, Sophie stopped being able to maintain her balance. Though she had been somewhat lethargic all day, she was now unable to do more than lie on her side. The cat that had been introduced to me as a temperamental beast was rocking back and forth on the cold bathroom floor as Brenda's other cats watched on in confusion as Sophie dragged herself to the corner between the toilet and the bathtub.

We made her warm, gave her some blankets, and made sure the space heater in the bathroom was on and working. Though worried, Nikki and her family had to go to the singing Christmas tree. They couldn't stay behind; I could. I did.

At intermission, they called to check on Sophie. She yowled when I opened the door to the bathroom, a sound so uncharacteristic of her typical hissing and growling that I decided to move her into the living room of Brenda's house.

I picked her up gently. I wrapped her in blankets and brought her to an armchair and set her in my lap. She yowled again as I tried to make her as comfortable as possible, but started to purr once I was able to lightly pet her. We watched Family Guy. She purred.

She purred and purred.

After a while, she stretched a big, long cat-stretch, and she opened her mouth as if in pain. A squeaking noise escaped, and she became unbearably tense. Shh, it's OK, you're all right, you're all right, I said, over and over.

Nikki called to let me know the Singing Christmas Tree was over and they were all coming home. They'd be back in ten minutes. I'll see you soon, I said, drive safe.

And I cried and cried, wondering how I would tell Brenda when she got home.

From Perihelion to Aphelion

When the sun begins to die several billion years from now, it will expand and destroy most of our solar system. The sun, transforming from a G-type star into an immense red giant, will consume the innermost planets of the solar system. Earth, her continents, and every shred of evidence that humans once existed upon her, will be swept away by an unimaginably destructive wave of heat and plasma. As this happens, cascades of hydrogen and helium mixed with metals born in the heart of the sun will be ejected. The sun will lose a third of its mass, the outer planets will drift away, and the once vibrant star will inevitably transform into a white dwarf. Not explosively with a supernova. Slowly. And that white dwarf, the stellar remnants of our star, will, after billions of years, fade to black, just barely warmer than the cosmic background radiation of the universe.

When I was just under 10 years old, my dad took me on a long drive out into the back roads of Portland to show me the Hale-Bopp comet. I remember when I first saw it, the moment I was able to look into a clear sky that for weeks had been unremittingly overcast: the comet looked like an artist's depiction of a distant star traveling across the night; the bright circular center that was the comet itself and its long, luminescent tail that stretched through space, through time, through the night sky above nine-year-old eyes. Its wispy tail still haunts me: the milky white flush against the black of space, illuminated just like the moon, but not rock, not the

familiar reflected light of Luna, rather water, ice, and gas lit aflame by the unseen sun, and so very far away.

Hale-Bopp was at its brightest. Though I didn't know it at the time, the comet was visible for longer than any other in recorded history. Watch it while you can, my dad said as we sat on a blanket in the small hours of the morning; it won't be back for over two thousand years, and you will never have the chance to see it again. Not in your lifetime, not in your children's lifetime, or the lifetime of anyone who will be born for thousands of years.

And it seems so strange to me, now, to think that no matter how much time has passed, no matter how much time will have to pass before it will return. Hale-Bopp's still out there somewhere, past Neptune, perhaps headed toward the scattered disc, home to many others of its kind, waiting until it is once again called from the inky depths of space; gone for years and years and years.

If I were to be honest, I have to admit that infinity doesn't make much sense. According to mathematicians, there are more integers than there are stars in the sky—an infinite number of integers. For a moment, that makes sense. But what doesn't make sense is that there are just as many odd numbers as there are integers. Why would they be the same? The set of odd numbers is the set of integers with all of the even numbers removed. Yet mathematicians say these sets are equally infinite, and, to make matters worse, we can partition them into an infinite number of infinite sets and find that each and every one is equally infinite. And infinity becomes altogether more

confusing when you find that this is only one order of infinity, and it is mathematically the smallest infinity of an infinite number of infinities that exist.

I think there are an infinite number of years between when I saw Hale-Bopp in 1997 and when it will next return in 4385. By the time Hale-Bopp returns, I will be older than antiquity is now, and I feel so removed from Archimedes, Euclid, Pythagoras, that it seems reasonable to say that there have been an infinite number of years between their lives and my own; the divide between us is just as impossibly distant as the time between when Hale-Bopp shone down on me when I was a child and when it will next illuminate Earth's skies.

And there have been an infinite number of years since my father's wife, my step mother, died in 2003. Though so much time has passed, I can remember the last night I saw her, in a hospital bed in their small Corvallis home, the unimaginable sorrow in my father's eyes, and the rise and fall of her chest as she slipped in and out of consciousness. Her tiny body, devastated by cancer and chemotherapy, was in blankets, warm, comfortable, being held gently in my father's arms as he whispered Tonight might be the last. And it was. And in one night Lisa became impossibly, infinitely, distant.

I remember forever ago, when, at her funeral, my father took me gently to her side. Her once warm body was cold. Pale. Agonizingly present. I remember when he said It's time to say goodbye; you will never have the chance to see her again; she's

gone. And I remember when as I lowered my eyes, he said, Goodbye, goodbye, goodbye.

In 2400 years, Hale-Bopp will again be seen in the sky. Perhaps for an impossibly long time, hanging in the heavens, suspended in mid-air, casting pale light down once more before traveling infinitely far away, beyond Neptune, toward the Oort cloud, into the shattered disc that so many comets call home, and wait another impossibly long time before beginning the slow and infinitely long journey back toward the sun.

Because Hale-Bopp comes back.

And it will continue to come back until the day the sun burns red, expands, and consumes the very skies Hale-Bopp now calls home, leaving the comet adrift in space with Jupiter, Saturn, the gas giants as they flee from their dying sun.

When that day comes, when the Earth has melted away and the bones of all who have ever lived and died are dissolved in nuclear fire, Hale-Bopp will finally be as impossibly distant as Lisa is now.

That is infinity, and I find I'm surrounded by the infinite, surrounded by impossible distances through space and time, all of them so terribly far away, equally removed from anything I can ever experience again.

But I wonder about what the mathematicians say; I wonder about the higher infinities; I wonder if perhaps the infinities I know aren't so terribly infinite after all.

Teeth

I haven't spent enough time looking at icicles. They stand in contrast to the snow—stalactites to the snow's stalagmites, clear to the opaque—seeing them side by side is normal, expected even, if not unsettling. Over the last several days Lebanon has been hammered by the winter storm Orion. The snow has grown higher than I have ever seen, save for my occasional trips to Mt. Hood, and I've watched as the surrounding ecology shut down one process at a time. Schools and stores closed, roads became impassable, and the residents slowly became isolated from one another as each family closed their homes and left outdoor excursions to the braver—foolhardy—few who either had four-wheel-drive cars or four-wheel-drive minds.

In Lebanon, I'm renting a room from Brenda. Much of her extended family lives in a clearing off Santiam Highway, behind the complex that used to be Cascade Autobody, the shutdown family business, and their homes are enclosed by trees and gravel roads. Orion brought embankments that cut off all means to access the highway, and, eventually the cracking of timber and short-term avalanches common to forests covered in snow. For three days, the families behind Cascade became the only world I knew. We visited. We watched the snow turn from soft powder to jagged ice. We visited and shared meals together.

I've always thought about becoming a vegetarian, mainly because some animals have the ability to recognize their own reflection. The mirror test is unappetizing. I don't like the idea that something I'm eating has the capability to see

itself in the mirror, to see its body, its form, to see itself as itself. Not all animals can pass the test, most seem confused by an image that makes no noise and has no scent, but those that can draw an uncomfortable amount of attention to the invisible line between human and animal consciousness, much less the tenuous distinctions between human and ape consciousness. When the mood strikes me, I imagine myself, the omnivore, as an accomplished cannibal, and I find myself disgusted and without appetite. Sometimes it can be difficult to see what sets the "human" anything apart.

Julianne, my fiancé's sister-in-law, is a vegetarian. She made her first pot roast yesterday, and invited us over to try a bite. She had prepared the meat in a crockpot with carrots, potatoes, onions, and rootbeer. Before we arrived, her husband, John, called Brenda to ask how to cut the roast. He told his mom that he had never eaten one before, and he wasn't sure what to do when the roast pulled apart in long sinuous strips. When they were ready, we made the slow trek from Brenda's backdoor to John's front porch, said hello to his six children, and tried a vegetarian's first pot roast.

Humans are not independent. We're beings of context, defined by our relationships and circumstances, constantly existing in the buffer between our internal sense of self and the external environment. When those circumstances change, so does that middle-place, so do we. In the midst of a winter storm that has cut off contact with the broader community, a vegetarian's pot roast isn't an absurdity, it's the day-to-day—mundane. But the icicles I see hanging from the roof, the transparent cones that indicate a sense of order in contrast to the chaotic settlement of snow—for

me, these icicles resist the absurd. They are meltwater, rain, liquid frozen in place as it barrels after gravity toward the earth. Icicles remind me that snow melts, that vegetarians don't cook meat.

After dinner, I thought about icicles. A three foot long one was hanging outside the laundry room window, several smaller icicles on either side, and as I looked from the wide base to the narrow tip I could only think of teeth.

On the day the ice coated the snow, I was awoken by tree limbs falling onto the pavement outside my bedroom window. Widowmakers, they're called. The limbs that fall without warning and can severely injury anyone underneath. Of course, we worried about our cars and spent the next two hours moving them as far away from the trees as possible. We had to clear the roads first; the falling branches had made them impassable. Yet as soon as we moved one car, another branch would fall and we'd have to clear the way again. We worked like this for some time. All of us cold, all of us worried about the next branch to fall, and we worked to the beat of distant wood splintering, the brief showers of snow, and the temporary silences that followed.

I'm not sure I find it relieving that animals don't worry about protecting cars. I like to imagine that animals don't worry about possessions, but something as simple as a squirrel storing nuts, or tool-using apes, suggests that they may have their own form of possession they worry about just as much as us.

Icicles scare me. The day the snow began to melt I found the ones outside the laundry room window had fallen, but they had not shattered. They were embedded in the ground—the force of gravity had given their tips enough kinetic energy to pierce the frozen earth and the heavy base had pushed them deep. I imagined if one had landed on me, had punctured my skin, had driven downward and through. Suddenly, the widowmakers seem much like teeth themselves, flat and crushing molars, and Orion becomes a storm with teeth everywhere, an omnivore as above my human being as I am above a pot roast.

Those four-wheel-drive minds who ventured out regardless of warnings seem a lot less foolhardy. They seem scared, perhaps more aware of the immensity of nature than I. Their cars, their fortresses of metal and glass, resist Orion, deny it, refuse to be shut away by ice and snow. I get that. Snow in the Willamette valley draws out the absurd.

I still think I haven't spent enough time looking at icicles. The snow is melting, and we're finally able to leave the confines of our homes, no longer afraid of trees and falling branches, but the image of Orion's icicles remains. Like humans, icicles don't exist without context, and the space between an icicle and the underlying earth is not empty.

Empty Rooms

Two years ago, I had a paper accepted into the Conference on College Composition and Communication. The conference, known either as CCCC or simply "the Cs," is considered to be the most prestigious conference in the field of rhetoric and composition studies, and, as I was just beginning my graduate education in Writing and Rhetoric, I was filled with a mixture of excitement and anxiety. Fear that I would make a career-ending misstep, but anticipation that this could be the start of greatness, a grand career.

Conferences are a peculiar thing. A large number of people working in the same field, or similar fields, and occasionally fields that are tangential, gather together in cramped rooms and present the product of their thought and labor. Prestigious conferences are prestigious because of the giants who attend and present, and they provide limitless opportunities for networking with people you would never otherwise meet. The Elbows and Bartholomaes of the field. Figures often spoken of in classrooms, but distant, far away. Conferences change that dynamic.

Three days before the conference, I opened a blank word document and started my paper. Seventy two hours and one plane flight later, I was in St. Louis, Missouri, with "QED," a ten-page paper that chronicled my transition from mathematics to rhetoric and composition studies.

This was the first time I flew alone. My first business trip—the first flight not intended as a vacation but as an opportunity to better myself professionally. I was twenty-three. My sense of adventure was titillated when I drove fifty miles to sea

lions in Newport—nearly two thousand miles toward the geographic center of the United States was altogether alien, so beyond my ability to comprehend that part of my brain simply shut off and limited my sense of travel to driving to the airport, sitting in a plane for several hours, and finding myself in a new place that was different, but mostly similar, to where I had just been. For all intents and purposes, it seemed as if I had traveled more through time than space.

Place is a difficult concept to understand. One interpretation is that place is where you are at this moment, the chair you're sitting in, the walls around you, the city, region, country, continent, hemisphere, planet, solar system, galaxy, galaxy group, galaxy cluster, super cluster, sheet, wall, filament—limited here if we discount the possibility of innumerable and unmeasurable universes outside our own. But, as we zoom out, we reach the "End of Greatness," where no more superlatives can be used to categorize large-scale structures in the universe. At this scale, the universe is considered to be homogenous and isotropic, the same in all directions. Everyone and everything we know is in the End of Greatness.

There is another theory of place that has less to do with spatial location. In this view, place is context. Role. Place is where you are at a given moment in time, comprised of the events that brought you there, and describes your function in a given environment. Place is one way you understand yourself, one way of understanding the multitude of experiences that have shaped where you are and where you are going. There is an End of Greatness here, too, when the words we use to describe the

relationships between our life experiences no longer suggest some larger pattern events, when we start to realize how similar our own lives are to everyone else's, that we are not singularly unique, not special, not guaranteed success by the prestige of our experiences.

If I had been older, I might not have been surprised when no one showed up for me to present. The disappointment as I looked around the empty room might not have been so overwhelming, and I might have understood why the other members of my panel seemed unsurprised. Because conferences are a peculiar thing, and when the Bartholomaes and Elbows are presenting papers at the same time as the Schmidgalls of the world, they seem more distant than ever before. A reminder that it is important to know your place. And I might not have been so unsettled when one of the members of my panel said the important part of being accepted to the Cs wasn't presenting your work, it was so you could put it into your CV. Attitudes like this seem problematic.

In 2010, I was invited to attend the MCTP Bridge Program at Texas A&M. I had been accepted to several graduate programs in mathematics, and the program was intended to prepare undergraduates for the type of mathematics they would face in graduate school: math based in abstraction and apparently removed from any discernible real world enterprises.

I understand why “What am I ever going to use this for?” is the unofficial slogan of mathematics. It is difficult to imagine how the topological structures of

compact spaces relate to personal identity. I can understand the widespread distrust of unrealistic and unintuitive word problems, concepts disconnected from the activities of everyday life, sterile graphs and abstract functions that do little to dissuade those who suspect that mathematics is an elaborate time-sink, a game that has obscure rules and even more obscure objectives. No wonder so many believe mathematics has no place in their life. But the sense of place that accuses mathematics of impotence, that relegates it to the role of trivial distraction and unimportant diversion, does not take into account what is not known, how each experience is going to fit into a greater whole.

I found I did not enjoy abstract algebra. The passion I had for number theory and cryptology ran head first into the grim reality of mathematical analysis. The bridge program was a huge success.

I think the flights back from Missouri and Texas were in the same place. Both knots, the same knot, existing in the End of Greatness, and they left me wondering where I belonged, calling into question the plans I had made for my life. How I understood my place.

Though I'm older, I still cannot agree with the member of my panel who said the Cs was about the CV. I think conferences are about a lot more than just a line in a CV. I think they're about empty rooms.

Imitating Thomas

Imitating Thomas' style and structure was difficult at first. My tendency toward the bombastic was made clear, and line by line imitations of his writing pointed out each instance I wanted to drift into abstraction or restrict myself to an A to B to C organizational structure. For that matter, imitating him forced me to move out of a strictly linear, logical progression of thoughts and ideas, and see meaning as ongoing relationships between multiple lines of thought, thoughts that would loop back on themselves and break off in a new direction while still very clearly written in terms of what has come before.

Approaching Thomas' "Late Night Thoughts on Listening to Mahler's Ninth Symphony" was particularly exhausting. At the time, I thought I had to understand a text in order to imitate it; not only did I not understand the piece, I was intimidated by it, aware of the massive gap in life experiences between Thomas and myself, decades and decades, careers, formative events I have yet to even imagine, and "Late Night Thoughts on Listening to Mahler's Ninth Symphony" seemed to represent everything Thomas had that I did not. Here was a man who had lived through both World Wars, who had lived before nuclear proliferation, or even nuclear weapons at all, and he was describing the poisonous consequences of a constant nuclear threat. He wrote about how he cannot understand how the teenagers of that day and age did not think the adults absolutely mad, and demonstrates deep concern for those who would come later—me, my generation, those born today and in the future—who would grow up

under a nuclear umbrella, never knowing a world without weapons of mass destruction.

So, yes, I was intimidated by "Late Night Thoughts on Listening to Mahler's Ninth Symphony," and I could not imagine how I would imitate something as existentially terrifying as the reality he described.

I've grown up around doctors. My father is a radiologist, and he worked in an emergency room in Portland for years, contending with situations ranging from the human body's response to shotguns to its struggle with sudden cardiac arrest. He has told patients they were dying, families that their father, mother, brother, sister will never come home, and he has treated illness that could not be understood without bombardments of light. He has seen the elderly, the young, and the apparently healthy die. But the way he talks about death, the way he discusses the passing of those he knew growing up is conversational, matter of fact, natural.

In “Dying as Failure,” Thomas explored the way humans grapple with death and dying, and, as a doctor, provides insight into the difficulty those most exposed to death deal with on a daily basis. For Thomas, the difficulty to cope with the deceased is magnified in a society that has distanced itself from public and personal exposure to sickness. Science, he wrote, has stopped us from dying from once deadly illnesses, from strep throat, tuberculosis, and reduced our exposure to the natural, but unmistakable, act of dying.

I don't think doctors see the human body as a simple vessel of the mind. It seems that they see the body as a system of interrelated processes which can be affected by external circumstance. They see the body as cells and tissue, organs and neurons, and they have to balance all of this against the very real human beings they call patients. I don't understand what it's like to be a doctor, I'm not sure any of us do, but the role they play in our lives is necessary and important.

Lewis Thomas was a doctor. He worked with the unknown and never stopped trying to understand how to address situations and ideas that he did not understand. That helps: there is permission to not understand his writing.

I had a deadline. I started writing and did not stop until I had grappled with each of Thomas' sentences. The result was "Early Morning Thoughts," an exploration of Chopin's "Raindrop" and historical uncertainty. Whether it was a “good” imitation was not nearly as important to me as it being an accurate imitation, a recreation of the relationships Thomas established. I could not bring nearly as much nuance into my writing as Thomas, but I was able to establish a base-line understanding of his perspective when he wrote "Late Night Thoughts on Listening to Mahler's Ninth Symphony"; a sense of familiarity that slowly undergoes a reversal due to changing circumstances. By imitating something far beyond my capabilities, I was surprised to find that I could understand many of the decisions Thomas made and why he made them. Further, I could see the way meaning flowed from his own experiences and mixed with public discourse and world events—thought I am far removed from

Thomas, I am connected to my own context, my own experiences, and the essays that followed flowed much more easily than my previous writing.

In many ways, I think imitating Thomas has given me “permission” to be a writer. I had a number of conversations with my thesis advisor where I expressed the belief that I wasn't allowed to write about "cliché" topics, about death, about loss, about being a 25-year-old graduate student who really doesn't understand the complexities of life. I cannot blame this on 20 years of education; I don't think it would be fair to say that I was unevenly yoked to the expectations of teachers and professors to the point that I became unimaginative and unwilling to write what I actually thought. Imitating Thomas, forcing myself into another mode of thinking and attempting to replicate an unfamiliar perspective, laid bare the personal narratives that served only to limit my voice rather than shape it.

Thomas chose words with surgical precision, connected sentences together in a consistent and meaningful pattern, and was not afraid to step from the complex to the simple in the space of a period. Imitation helped me see that; Imitation helped me do that. Thomas taught me to not be afraid of leaping from one idea to another, that it was OK to trust the reader as long as I took care to craft meaningful relationships.

I think this is where I found some of the greatest value in imitation. What might appear to be an activity requiring little thought or originality provided an opportunity to reassess the set of personal narratives I used to define my identity, either by demonstrating new modes of thinking or pushing me to take a half-step out of my self and use Thomas' writing as a vehicle to shape and move my thoughts. I

think Thomas experienced something similar while reading Montaigne. The slippery nature of the self seems made for imitation, and it seems we often imitate others whether we mean to or not.

And that's just fine.

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