FEAR AND LOATHING IN ACADEMIA: CHALLENGING THE DIVIDE BETWEEN SCIENCE AND THE HUMANITIES IN THE MODERN UNIVERSITY

by

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ABSTRACT

This paper examines the status of the conflict between science and the humanities in the context of modern university studies, and, through an examination of historical and disciplinary voices, suggests that such conflicts are not only needless, but unfounded as well. I propose a radical reorientation of the disciplines under the singular aegis of human cognition, and postulate that radical interdisciplinarity would lead not a dissolution of speciality, but rather to marked improvement in human epistemology.

CHAPTER 1

TWO: "BACK OFF MAN, I'M A SCIENTIST!": WHY I CHOSE TO TOUCH THIS SUBJECT WITH CONSIDERABLY LESS THAN A TEN-FOOT POLE

"We were somewhere around [a masters degree] when the drugs began to take hold..."
-Hunter S. Thompson (well, sort of), *Fear and Loathing in Las Vegas*

"Your theories are the worst kind of popular tripe, your methods are sloppy, and your conclusions are highly questionable; you are a *poor scientist,* Dr. Venkman."
-Dean Yaeger, *Ghostbusters*

"Maybe I shouldn't be singing this song; ranting and raving and carry ing on. Maybe they're right when they tell me I'm wrong....*NAH!*"
-Dr. Denis Leary, "The Asshole Song," *No Cure For Cancer*

"Our present business is with inward preparation, especially the prepara tion of those who have ceased to be content with the old, and find no satisfaction in half measures. I have wished, and I still wish, to disturb no man's peace of mind, no man's beliefs; but only to point out to those in whom they are already shattered, the direction in which, in my conviction, firmer ground lies." -D.F. Strauss, qtd by T.H. Huxley

As a child, I once made a game of ramming a stick into a hornet's nest and then running like hell. Needless to say, this was a bad idea (although it should be distinctly noted that I can run like the wind, and was only stung once, on the back of my left knee). As an undergraduate at Tulane, I frequently made a game of suggesting, in my own placidly infuriating way, that good expository writing in the field of comparative literature was not structurally different from the various forms of composition evinced by the hard sciences. After all, I would suggest time and again, both involve the presentation of hard

evidence in support of a theory. I meant only to provide evidence to this effect when I stated that I have unabashedly approached my scientific and humanistic journal articles heretofore with the *exact same* philosophical and rhetorical stance: I *always* 1) formulate a hypothesis 2) collect data 3) locate related scholarship and 4) explain why it matters (admittedly, this last one's always been more of a challenge). Why were they getting upset when they were told that what they held in their hands was actually a scientific paper, complete with abstract, and containing quotations and direct text instead of raw data? But as primal, incandescent rage filled venerable humanist eyes and untold scores of creaky formalists raised rusty scimitars, I would realize the amusing truth: I'm a slow learner.

But as I attempted to parry the overweening thrusts of this new-age *Army of Darkness* and (only somewhat successfully, I confess) dodged the potent barbs of their domineering necromancer overlord, I wondered: why all the fuss over such a seemingly innocuous comparison? After all, students frequently charged Hamlet with being gay in my Shakespeare courses, and the professors never once projectile-vomited, nor (to my continued disappointment) did they commence violating themselves with Folger editions. Surely my claim wasn't that outrageous. And besides, weren't modern universities always advertising the close working relationships between their various colleges and subsequent enrichment of their students? Was this all (*gasp*) mere lip service in reverence of the academic synergy gods? Did humanities and science faculty nod to one another as

they passed on the quad, only to hiss and make obscene gestures behind one another's backs? Were silent alarms tripped when they tried to enter each other's buildings? Did they put anti-humanist bear-traps by the coke machines and set anti-scientist claymores on the couches of the second-floor lounges?

So, in the interest of full disclosure, I decided to ask. Ask my evolutionary biology professors, that is. Right smack in the middle of one of my evolutionary biology classes. In the presence of other evolutionary biology students. Because though I am passionate about literature, I am, quite literally, a child of science. Geology and engineering have taken me around the world: I grew up in Malaysia and Venezuela. I'm a tomboy. I'm a geek. I like *bugs*, for heaven's sake. I tend to collate data and look for trends and patterns and cause and effect (and once--swear to god--I had to reassure a cubicle-mate that I was not a robot, directly after an English professor told me my thought patterns resembled a computer algorithm). And, ironically, it is *that* quality that has made me an academically successful, professionally published scholar (my first humanistic paper was accepted for publication a semester before earning my masters degree): I am as comprehensively thorough in my research as possible, and even my humanistic journal papers tend to read like validated hypotheses. But, as I said before, I am also a student of science. Since this doubtless will leave you quivering with antici....*pation* in regards to my personal viewpoints, I guess I might as well go for broke: I am a constructive empiricist: observation, evidence, and replicability are crucial for accurate interpretation of natural phenomena; of course, not all phenomena can be directly observed (as with atomic the

ory), but hypotheses can be validated if we can accurately and reliably predict the outcomes a theory explains (which is why metaphysics, religious ontology, and extreme postmodernism are all bunk). This is different from hard-line positivism, which teaches that only data we can perceive with our senses is reliable, that our theories must hold true for all times and places (obviously there are two grades of physics, so no) and that no human values can ever influence 'true' science. Nor am I a reductionist: like most modern scientists, I do not believe that all human studies can be reduced to factors in a single, unilateral, big TOE (theory-of-everything). On the other hand, I do not believe that all disciplines inherently deal in separate, non-overlapping objectives and methods (Gould's concept of non-overlapping magisteria, or NOMA). To believe this is to hint at extreme postmodernism, particularly the belief that, in academia, there is never any common ground; that no human can ever understand or relate to the condition of any but his disciplinary fellows. On the other hand, knowledge *is* socially constructed. And so, caveat emptor: if you are irrationally opposed to any of these concepts, you as may well set this book down now, and save yourself some time and petty cash.

And now, back to our story.

I came ready for a fight. Finally, the appropriate moment came. My lips parted. The question was posed. Silence for several milliseconds...my breath caught in my throat. My heart pounded. I listened for the soft squish of dozens of sphincters violently clamping shut...but it never came. And then--a miracle. The professor shrugged. "Yeah, I guess that makes sense." My eyes opened wide. My palms sweated, ready for a sneak

attack. I hung on his next words, hearing them in epic slow-mo: “Okay, that wraps it up for today. See you next time.”

Students (normal, flesh-clad ones) were rising to leave, packing up notebooks and chattering about the midterm. No one seemed to care. The professor was fielding short questions about the reception of various emails. Was it really over? Was I really being allowed to escape, unscathed? Emerging from the dank, ancient darkness of Dinwiddie Hall, I shielded my eyes against the glaring New Orleans sun. Students streamed around me, heading variously for lunch or another class. My knees felt weak. I sat down hard at one of the rough stone benches, dazed. Had that really just happened? Did an inviolate veteran of the hard sciences...just...*not care* if good humanities writing resembled that of his province? It had to be a fluke. Perhaps he hadn’t heard me correctly? Perhaps I had unwittingly said ‘humanists are a bunch of slack-jawed hillbilly idiots’ in my broken academese?

To make a long story...err, not any shorter at all, really, since I just told it...humanists *deplored* the notion of similarities between the disciplines, scientists embraced it. Or shrugged and grunted (which, if you know any wildlife biologists, is often roughly equivalent [please don’t mistake my praise of their stoicism for an insult]). And yet, for all my social experimentation, I was still no closer to uncovering why this little proposition of mine was so threatening to the mental integrity of humanists. In other words, I became a huge pain the ass (all right, all *right*, I already was one--happy now?)

So I decided to pursue a masters degree in literature. This was not a mistake; I love literary theory and culture with a passion. But it was a bit bizarre at first. Let me start out by saying that bygones *are* bygones, and most (if not quite all) participants involved have since become fast friends, jovial colleagues, and dependable drinking buddies, having accepted each other as flawed but generally well-meaning human beings. Further--and even more exciting--is the fact that most of my colleagues now perceive (truthfully, several always did) science and literature as being fundamentally alike. Lastly, and most importantly, however: the following is going to make me sound like an asshole. I know this. It is an unavoidable side-effect of the process of personal exposition. I did not just make that word up. (I am not turning into Peter Venkman.) Anyway. During my first year, I poked around and asked around and surfed around and finally learned about the dichotomous "Two Cultures" and the Kuhnian paradigm shift. I learned about the diverse applications of Whewell's 'consilience' and Gouldian NOMA and I learned more about reader-response theory. I learned about the rhetoric of science movement, in which scholars like Alan Gross and Jeanne Fahnestock analyzed the classical rhetorical moves of scientific discourse. But I still couldn't account for the look of sheer terror and alienation that surfaced among the sane and well-balanced masters students and professors in my lit theory seminars when the word 'science' was mentioned. (It was like that scene from *Ace Ventura II* when all the tribesmen kneel at the verbal mention of their deity; I could say 'psy...*chology*' or 'sci...*atica*' and be safe, but not the other unholy s-word, for my face would summarily be rhetorically pimp-slapped.) I (perhaps even we) felt like

one of O'Bannon and Shusett's *Aliens* intruding upon a quiet episode of *The Brady Bunch*, an Edward Scissorhands equipped to manipulate a fistful of Occam's Razors, rather than the subtle manipulations of Derrida or Levi-Strauss, invading suburbia. What the hell had these people so spooked? (I mean, besides my two sets of jaws and constant mucosal salivation.) It's like they expected a trail of facehuggers to scamper up in our wake and fatally impregnate them with my 'scientific fascism,' so that together we might act in savage, blind defense of our Queen (a sublimely terrifying version of a dominating, monolithic Science [and totally false, by the way]).[1]. Though we had explained that modern science is not strictly positivistic or reductive, it still seemed as though, in the eyes of my fellow nascent English-people, science was just a horny, testosterone-fueled conquistador, a mad dog out to rape and pillage the sacred poetic temple, a blind, unfeeling automaton hellbent on leveling humanistic creativity and replacing it with glorious uniformity; such, alas, was the potent, poisonous mix of institutionalized ignorance that branded any seminar student who dared enter the humanistic stronghold with anything less than postcolonial hatred of scientific 'hegemony' a perverse, reverse-subversive *malinchista*. Myself and the other science major in my year (like me, her intellectual curiosity led her into more than one theoretical abattoir, but unlike me, her bachelors was in biology, while my English degree provided somewhat superior camouflage) were often made to feel --at first--like Nazi eugenicists or Communist spies, bold fiends daring to

[1] Although, admittedly, I once--completely on a lark--turned this around in a rhetoric class and characterized humanists as players in an academic Alien life cycle (freshman=egg, Masters candidate=chestburster, assistant professor=drone, etc, only to be taken at face value [or maybe I was humored)] and told that 'unfortunately, the metaphor breaks down at the Queen' [in this case, the lit department chair, since apparently no one really enjoys occupying the position [although, for the life of me, I can't figure out why...])

tread in the idyllically fecund heartland of bunny-bread, apple-pie America. Sometimes this arose apropos of nothing. (After one particularly *strange* class, for example, I remember someone made a point of drawing an unflattering caricature of a flatulent, my opic, lab-coated male scientist on the whiteboard in the TA office; I am happy to report that, thankfully, myself and this person had a good laugh about it later.) More often, however, the animosity of our counterparts flared like bad hives when she or I would suggest, quite humbly **cough**, that being versed in the sciences would benefit and inform (*not* simplify or replace) many of their fiercely-debated, personally-wedded arguments regarding race, class, gender, and linguistics. And always, in the back of my mind, I knew that, in an anthropology, biology, or behavioral science class, these suggestions would be met only with approval (albeit grafted with some puzzlement as to why I was bothering to bring up what was surely self-evident).

Nor did this animosity end outside the seminar room: people got hurt (emotions ran high for many students in nearly every class) and they were personally attacked behind their backs simply because they refused to adhere to the 'enlightened' majority humanistic perspective (and here I thought only scientists were supposedly to be unilaterally biased *sarcasm*). The other scientist in the room, on the other hand, was literally ripped apart in class *and* when absent, often with personal attacks loosely based on her 'hard-assed' scientific perspectives: she was evaluated, by both professors and students, as being 'abrasive,' 'tangential' even 'unwilling to conform to group standards.' Now admittedly, she was no airhead butt-kisser: she had opinions, and she wasn't shy about

voicing them; however, these attacks were often based not on her personality, but on her 'contrary' scientific voice in an otherwise 'purely humanistic' forum. I heard things like "why is *she* here, anyway? isn't she a scientist?" and "she's a scientist; she just doesn't get it." It was almost as if, to them, she had no *right* to be there. Meanwhile, *I* was handed bizarre but genuine enquiries, usually prefaced with "you like science, right? why do scientists..." I was more than happy to attempt an answer, of course, but was disheartened by their lack of understanding, which had doubtless been enforced throughout their increasingly dichotomous university educations. And curiously enough, though the charge of latent racism was occasionally leveled at scientific philosophy, the *only* racist sentiment I've *ever* heard a professor voice came in my 'humanistic' bibliography class: one or two students simply could not accept a cultural paradigm shift, especially with the professor herself claiming that western civilization was better equipped to advance technology than its neighbors: that there was, for example, a definite reason the airplane had been invented by 'more intrepid' white men (she must have been absent that day in primary school when the instructor covered the engineering marvels of China, the Middle East, and Central America, or been willfully ignorant of the fact that the modern airplane was engineered using Arabic maths developed by a very non-white Muhammad ibn Mūsā al-Khwārizmī), and that, if you played the course of human history out over again, you would invariably see the same result (I only wish Gould had been there at that moment to slap her with a dead chicken and a curt "*NO*!"). Nor did I appreciate claims that science holds a limited, phallocentric worldview: in my own experience, the influx of non-

American and multicultural American students into most university science departments has triggered greater cultural understanding and tolerance than can ever be evinced by an academia-encrusted formalist. But enough of this unpleasantness--now the point: I relate these tales not to defend beleaguered colleagues, to point fingers, or kick some long-overdue ass: I do it because I see it as part of a sorry pattern in the humanities' relationship with science and enquiring scientists, *most* of whom are used to vigorous, multifaceted debate, and who embrace the playing of Devil's Advocate as a means of pursuing alternate routes of important scientific enquiry. Needless to say: mid-masters, my friends in the hard sciences were looking more and more friendly: not once, during my entire semester of graduate courses at the Oregon Institute of Marine Biology (after Katrina), did theoretical debate get personal (and we *did* debate, believe me--though I smirk now upon recalling that I was once upbraided for bringing store-bought Oreos to a theory session instead of fresh-baked cookies). The end of class meant the end of contention, and no one bitched or backbit.

But the sordid truth is that early 21st century humanists weren't born hating science. Many of them, in fact, couldn't care less about the supposed cultural divide, and do keep tabs on new scientific discoveries with the zeal of a computer engineer. So such disdain, when it does occur, is not a ghost in the machine--nor is it (as is sometimes thought) an intrinsic criterion for effective humanist training; rather, it is an ethos cultivated by years of being dismissed as a nonessential professional in a world of blatant academic functionality. In today's science and engineering-laden university, if you can't put a prac

ticality or palpable human benefit on your scholarship, you risk being dismissed as an ivory-tower bullshitter. You may recall the academic life-raft debate (in short, no one would choose a deconstructionist over an engineer as a companion on a desert island): today, such criteria are increasingly applicable to the modern university system. In such an arena, if you can't prove your usefulness you will, like the Serlingian librarian, be deemed unnecessary, and slowly sapped of your funding and grant opportunities (though, if you're psychotic enough, you won't go out with whimper, but with a bang). Of course, excellent cases can be made for the functionality of literary scholarship, particularly in the fields of history, pedagogy, sociology, and political theory, since they help explain human behavior and directly effect human legislation and policy. But these arguments, though vital, are not mainsteam among my academic generation. My own turn toward literature was, in fact, viewed largely with silence and raised eyebrows among my scientist peers. When I arrived at MSU, I purposely downplayed my scientific background to gauge non-humanist reactions to my work. As expected, I got a lot of tacit (but usually flawlessly polite) dismissal as an 'intellectual.' People who asked me what I wanted to do 'once I got out of school' were taken aback to learn that most people in my field seek tenured professorships--they never want to leave school at all! My work on popular culture was applauded as being 'awesome,' but outside of the fact that it dealt with texts reified by my own peer group (science, video game, and comic book nerds), and that I was extraordinarily lucky to be *paid* to study these topics (they weren't wrong), the subjects were imminently dismissible in favor of more pressing, real-world issues, such as pine

bark beetles, new hard drive technology (like RAID), or medical advances. (One mathematician went so far as to call my work bullshit; but then, he was half-joking, since by then I was already outed as 'science girl' among my English GTA pals.) A similar phenomenon occurred on a regular basis with my literary peers; at parties they would routinely be asked by other students about their field of study. Once outed as a humanist, they would slowly be deserted in favor of folks with whom the science majors could better relate (just back away slowly, boys; their vision is based on movement). (And all English majors have surely heard this one: "Budd, she's an English major. You know English, Budd? Yeah Jim, I sure do.") As a scholar, I know how disheartening such a response to one's professional interests can be; the truth is, it's hard to blame humanists for their prejudice, given the impoverished, anti-intellectual environment in which they often forced to operate. And the stakes are getting higher: frankly, unless you're into rhetoric and composition (with President Obama's stipulations to the G.I. Bill, more and more men and women are returning to the university for technical education, and university bylaws dictate that all of them will need an introductory writing course), you're in for a hell of a fight once you hit the academic job market, a fight that will be far less intense (though still difficult) for your colleagues in the sciences. But even writing programs are under a significant amount of pressure: the purview of many science instructors is that Writing 101 courses should be geared primarily toward technical scientific writing. Montana State's writing program is even under scrutiny to promote research techniques in its freshman programs, a proposition that, though potentially helpful, puts a lot of pressure

on the graduate students and adjuncts at whose feet these orders will fall. More importantly, this proposal stems primarily from the prevailing attitude that writing courses are there to service nascent scientists, rather than to expose students to the humanistic perspective. As you might well imagine, this too leads to considerable tension between humanists and scientists. But enough about that.

I, of course, am only one observer, with only one set of data, and so--if we are to be scientific about it--I cannot thereon hang a rapid, definite, and all-encompassing law; but I find the patterns I *have* noticed alarming, occurring, as they have, in departments and institutions both scientific and humanistic, private and public, elite and populist, northern and southern, by a faculty both elderly and youthful, both male and female, composed of rhetors, critical theorists, specialists, and biographers, with foci in research, theory, *and* practical application, and so I believe I am justified in attempting to venture a hypothesis as to *why* this is happening, and what, if anything, can be done to mitigate it. Anyway, to figure out why my fellows seemed so opposed to scientific discourse, and why scientific fellows seemed so dismissive of humanist discourse, I only had one recourse, the sacred and noble duty of all graduate students seeking entry into that ancient and universal company of scholars: lock myself in a room and read (*mo' olda' mo' betta'*) until my eyes bled. And I made (fingers crossed) a few insights that may help shed a bit of light on this conundrum.

First, though, I should state that, like Gould, I believe "in the dream of integrated knowledge, in the abolition of falsely restrictive intellectual boundaries. Above all, I be

lieve in the commingling of the arts and sciences as the two greatest expressions of human creativity" ("Fulfilling the Spandrels of World and Mind" [322]). I, too "regret the petty and parochial boundaries that both domains have established--the impenetrable and sterile language of so much scholarship in the humanities, the dry, impersonal and barbarous passive voice of scientific prose. I want to break through" (322). I believe that the hammer to fall will come in the guise of comparative studies and close analysis of what has already been written in earnest about the false divide between the two disciplines. Above all, I hope to demonstrate that because all scholarship is fundamentally creative, science doesn't obviate the humanities; that in fact, the humanities are simply an extension of science, which is itself a technologically sophisticated play on an ancient, fundamentally human and universal way of looking at the world, one which attempts to explain, order, and make sense of its various phenomena. Modern physical/natural science is, of course, the most accurate and efficient of the sciences, but this should not suggest that they can explain everything using their empirical methodology: currently, human enterprises like literature and creative writing are most accurately described and claded (for even humanists love to categorize writing according to time period, genre, and structure) by dissecting them with close textual, anatomical analysis, using a variety of increasingly sophisticated, probative literary tools. It is true that scholarly selection for these tools does move at a slower pace, because they must be tested over scholastic generations, rather than in much more rapid laboratory or field sessions (which is also why paleontological debates possess such longevity). But always, the goal of our inquiries is the same:

why do humans and their environs (ranging from the local to the Universal) do what they do? What brought us to be who/what/where we are? In attempting to answer this, we all deal in factual inquiry, whether we are comfortable admitting it or not: there is not one of us who publishes a paper believing, in his heart, that it is not factually argued, or that there can be a 'more objective' refutation to the claims being argued. Thus, asking what message lies contained in a poem of a particular style is fundamentally no different from asking what caused the explosive growth in the Mountain pine beetle (*Dendroctonus ponderosae*) population of the American Rockies in the last decade. The poem may be about racial equality and teen empowerment, while the problem with pine beetles may be global warming; but ultimately, our overall goal is to ask what we can do with this knowledge. How does it help us better understand ourselves and our world? How does it optimize our lives? How does it inspire us? The poem, for example, forces us see through the eyes of another, while the latter tells us that humans are indeed capable of negatively altering their world in surprising and lasting ways (so for goodness sake stop using fossil fuels!) However, as Gould points out, we cannot ascribe a purpose and causation to *every* phenomena in the sciences: art, literature, film, even biology; they all possess epiphenomena, interesting for their own sake, but not always ascribable (or perhaps not yet) to any paradigm.

Any way you slice it, humans are tool users, and I mean this in both the anthropological and Foucauldian senses: our strongest, most versatile tools have always been mental. Like most scholars, I define a tool as a physical implement, theory, paradigm, or

set of empirical methods utilized by animals as a means of accessing hidden or difficult knowledge and resources. Though anthropologists and neurologists have long explored the cultural and biological bases of our tool use, humanistic scholarship is also beginning to focus upon the deep reaches of our human need to create means of simplifying our lives. As composition scholar James Paul Gee argues, echoing Darwin, "any method goes with a *theory"* (*An Introduction to Discourse Analysis* 5), and all such scholarly inquiries are "meant to 'lend' readers certain tools," which he defines as "'thinking devices' that guide" our research (6). Karl Popper (the infamous humanist empiricist) points out that all knowledge is problem solving. In other words, we, as humans and scholars, are intrinsically adapted to problem-solve, to integrate external thinking and implements into our own operations; problems can arise when these technologies become stereotyped or political or used to the exclusion of others (this cuts both ways), but, for the most part, these tools are not *inherently* hierarchical (only petty human politics makes them so). For just as there are no two different groups of human brains, so there are no two dichotomous ways of using them (unless you want to argue that humanists are autistic); though most humans possess some hemispheric preference, there are no clear, detachable distinctions between math/science/literature/tactile arts--if anything, art and math seem to be coterminous: creative thinking has no biological disciplinary association. So, in a nutshell, I chose to write this paper, to face off with an otherwise sadistic, disillusioning Minotaur of an issue, because I believe that there is no salient difference between the efforts of science and the humanities (or *the* sciences and the humanities: it seems silly, but sci

entists tend to write ‘science,’ as if it were whole and all-encompassing, while humanists tend to write ‘the sciences,’ indicating their rejection of a singular monolithic science more in line with the humanities). So, from now on, I will designate the humanities as human sciences, and the sciences as physical science.

But this should not lead you to believe that I possess the Predatory intention of subsuming the humanities as a feeble branch of science, taking its head and spinal column as a trophy and leaving the rest to rot. Nor do I intend to lock it away in a dark closet under the stairs and feed it bunny bread and water until it starves to death; on the contrary, my time in the English department has taught me the subjects taught by modern humanism are *vital* and *necessary*: like science, they are a veritable *wunderkammer* of intriguing characters, heroically bizarre formulations, and beautiful insights by some truly brilliant minds, all or which can be potentially useful in explaining, exploring, and improving the human (and by that I also mean ecological) condition. Of course, neither should this suggest the dangerous fallacy that art and literature, because they are ‘older’, are more important than modern biology, math, or chemistry (because, if we really go down the historical rabbit hole, they’re the same age*:* the earliest form of extended writing was cuniform math used to keep track of agronomy, while cave art is now believed to portray reverent depictions of ecology and mammal biology). Nor should it dictate that literary criticism or philosophy are capable of explaining science as ‘*just* one way of knowing,’ as Alan Gross insists. If anything, each of the university’s supposedly disparate ‘knowings’ are really *all* one way of knowing, the only way *H. sapiens,* as a particu

larly bright terrestrial primate, has--and this, despite its rhetorical cleverness, is not the same thing. Further, science is not limited to university or professional standards: hu mans practice science on a second-by-second basis: when we go to bed early and avoid alcohol before a test or presentation, for example, we do it because we have evidence (probably personal experience, and probably more than one) that attests to the effect that doing so would adversely affect the next day's outcome. When we do this, we are drawing a hypothesis and marshaling data in support of it. Ditto when we avoid a sick-looking person in the grocery store: we know they may be contagious (whether from experiential data stored in our memories or from epidemiological data in a *Science* article), and that getting too close entails some risk of infection (we may even plot a radius outside of which we may safely travel around them...or not). Any way you slice it, it's science, which, obviously, includes math--and if you think that's crazy, wait till you learn that wide receivers[2] are doing mental calculus as they watch the parabolic rise and fall of the football, trying to gauge where it will land and precisely (to the millisecond) when to intercept it. And these, obviously, are things that we do on a daily basis, regardless of profession. So not only are all sciences equal propositions under science: there is also no such thing as a layman, only specialists and non-specialists (including other specialists) with essentially the same set of tools. To be brutally honest, I myself have never been comfortable with this term, and revel now in my wholesale rejection of it (as, I am sure, do my peers and colleagues whose thoroughly intelligent parents or loved ones chose not

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[2] *Who Dat!*

to take an academic degree, and were therefore dismissed from critical consideration by the odd academic elitist as a result). I also cringe at the word 'public(s),' and for much the same reason: we are all scientists, even if we don't recognize the term. And hey-- what's in a name? After all, a rose by any other name would smell as sweet (I prefer *Titus Andronicus* to *Romeo and Juliet,* but I will confess a fondness for that particular line). For at its etymological base, the word 'science' only means 'knowledge,' and the word 'scientist' hasn't even been around all that long: for most of human intellectual history, it was called humanism. So call it what you want--call it thinking, I don't care. Because you will still be dealing with the definition of the sciences. (And anyway, if all we're left arguing over is our collective tribal name, we will have succeeded beyond my wildest dreams.) I should also note that the only words I have sometimes have trouble with in relation to this are the dichotomously 'consilient' ones, like 'humanistic scientist' or a 'scientific humanist,' because, like I said, the dichotomy the singular terms immediately engender in the minds of most academics is false and limiting. Even worse (and a critical sin in human science discourse): they are limp tautologies. To sum it up by putting it another way: we're all finches; some of us have just evolved specialized beaks. (Of course, I should also state that, simply because fact is obtained scientifically and science is a facet of all human thinking doesn't mean that science can prove anything. To believe this is to believe science is meaningless, and this, of course, is a dangerous fallacy tantamount to the intellect's great enemy, nihilism. Take, for example, the phenomenon of lightning. Early religion taught that this atmospheric phenomenon was the product of the gods (as

with Zeus casting down his bolts). Though clearly false, such an explanation arose from the scientific impulse to classify and provide explanation, largely because humans did not yet possess the tools to understand electricity or atmospheric dynamics. Now that we do, we can test our theory of lightning as electrical discharge and obtain replicable results in a laboratory, results which can be accurately and reliably predicted. Clearly, such results would not be possible if Zeus really were hurling down bolts forged by Hephaestus atop Mount Olympus. For unlike the electrostatic theory, the so-called 'god hypothesis' can marshal no predictable data, and no replicable support, in support of itself. So even though the Zeus explanation arose from scientific impulse, it cannot be proved by science, and is therefore false. The significance of science is thus preserved.

Given the adverse effects of this ridiculous and unfounded tension, it may not surprise you that there have been real academic efforts at reconciliation. For the most part, though both human and physical scientists are beginning to seriously consider each other's scholarship, only the physical scientists have published visible texts attempting to reconcile the two fields and usher them, hand in hand, into the uncertain future. To be sure, rhetors and historians and philosophers of science have made significant and fascinating strides in illuminating the tangled and sometimes arcane base of the modern sciences; their careful scholarship has revealed the beautiful, perverse, sometimes overwrought past and considerably more well-ordered (but still occasionally muddy) present of the institution we call modern science. But they often remain mute (or worse, as we shall see) on the subject of how to heal the interdisciplinary animosity and move *forward*

into a mutually beneficial tribal synergy. And while science has found sturdy roots in many of its neighboring fields, such as history (carbon dating, chemical analysis) and so cial studies (behavioral psychology, genetic analysis), many literature majors (with the notable exception of those scholars engaged in the new study of 'literature and science') remain stalwart in their wholesale rejection of a future involving *any* scientific peership. But many, more established human scientists appear to be trying to re-cast the inner workings of science as a fundamentally human endeavor. Now, to point out the subjectivities inherent in science is actually quite beneficial, because, heaven knows, scientists are human beings, with thoughts and feelings and opinions, and we express ourselves in human writing, which, by the very nature of its ontology, cannot avoid the usage of rhetoric (we are *not* robots, for goodness sakes!). However, such analysis becomes denigrative when presented with a tone of dismissal: thus, we get usually astute but occasionally misguided scholars like Alan Gross, who do rare but silly things like reduce historical accounts of the discovery of DNA to Bahktinian fairy tale tropes, and then (moving the parallel from delightfully whimsical to sublimely ridiculous) using this comparison as canon fodder **pun** for exorcizing the demon of objective science from cultural consideration. *You kids stay off my lawn,* these reactionaries seem to scream at no one in particular, *or I'm coming after you with every postmodern tool in my box!* Meanwhile, on the physical science end of things, practitioners like E.O. Wilson can jump off the opposing deep end by implying that the human sciences can be explained away by the tenets of physical science, and that, in reality, their disciplines don't really exist. Given that such

well-published, diametrically-opposed views are (sadly) the most visibly recognized in the academic world, it *is* easy to buy into the dichotomous, fractured model of learning such theorists present, to forget that your brothers across the quad deal in the same stock and trade, that scientists simply possess a more efficient means of probing their subject matter, and that some scientists, though they can freely borrow from the open toolbox of the common scientific shop, must sometimes (as with literature or paleontology) use a set of 'low-tech' yet mentally sophisticated critical skills that are more time-consuming (considering that one's data comes largely from the disparate and far-ranging case studies in the literary canon), yet wholly necessary if the mechanics are not to smash the delicate workings of the rare physical and intellectual engine components upon which they labor. In other words, purely mathematical analysis may work well in very many situations, including variety of non-traditional contexts (including rhetorical analysis!) but it does not work *every* time, in *every* context. That being said, there are numerous fields in which demonstrable synergy would work wonders toward achieving clear understanding of the subject matter. Take, for example, the recent theses of my peers. One deals in pedagogical discourse analysis, which seeks to examine the success of variously authoritarian approaches to teaching, and what is called code-switching between, say, a 'laid-back' teacher who speaks with youthful cadence and a 'strict' one who speaks from a place of disciplinary superiority (Gilmetdinova 2010). In the human sciences, such discourse is achieved with the help of linguists like Noam Chomsky, whose work explores how language functions at the level of word/grammar/subject association. It may not surprise

you to learn that such theory has also been wholeheartedly embraced by primatologists, who utilize such theorists to question whether non-human primates (such as the playfully-named Nim Chimpsky) utilize language the same way humans do. Primatology, of course, also deals in animal behavior, and thus, questions why and how knowledge (such as tool-use [ranging from termite fishing to grammar]) is successfully transmitted between 'teachers' and 'learners,' and how this differs based on passive (laid-back) or dominant (strict) social standing. The connection should be obvious. Further, the author of said thesis was advised by her committee (consisting of scholars in the human sciences) that she should test her theory by observing a pool of both types of instructors interacting sequentially with the same group of students, then gauging both their social responses and their knowledge retention. Possibly unbeknownst to them, her committee was proposing that she set up a scientific (empirical) experiment, replete with manipulated variables and control groups. Like the author, the committee was observed to be thinking in a scientific fashion. Had any real disciplinary boundary existed, they could not have made these suggestions. A question then arises: how do you separate the human science of pedagogy and the physical science of primatology? I submit that you *cannot*, on any but an arbitrary and superficial level. So: can you see how this represents a synergy, rather than a reduction or absorption? Primatology cannot alone deal with the difficult and nuanced questions of human pedagogy. Together, however, they can create a better causative approach to what works, and *why*, in human teaching.

Yet another excellent thesis dealt with cognitive modeling of the dynamic tension between word and image in both Blake and Hemingway (Tangedal 2010). The author utilized what is called a tree-model to explore how a word is mentally processed and rec onciled with sometimes-contradictory visual evidence (whether pictorial or mentally-suggested). The author might himself be amused to learn that such tree models are common in behavioral psychology and animal behavior; I was particularly struck by the continuity of his model with the mechanistic 'cognitive machines' of famous ethologist Conrad Lorenz, whose work is still cited by prominent scientists in the field. True to form, the author's committee asked him to run the model with several different scenes/variables in mind. Once again, we are faced with human scientists acting in a very similar fashion to physical scientists. And now, finally, an example from the world of Shakespeare. We've often heard Shakespeare referred to as a 'universal poet''; we are informed by scholars that his works are capable of expressing common human fears, desires, and aspirations. Did you ever think to wonder if this statement could be scientifically evaluated? Probably not. But that is exactly what literature and psychology professors at Harvard and the University of Kentucky are beginning to do (Cohen, *NYTimes*, 3/31/10). Both are turning to cognitive mapping (particularly M.R.I.'s) as a means of explaining why literature (particularly fiction) holds such an appeal for readers. On the flip side, they are beginning to explain why most of us are afraid of Virginia Woolf, but can rocket through Grisham: the complex sets of intentionalities in Woolf offer a contrast to Grisham's straightforward prose, and thus, we can observe how the brain reacts when it encounters

both authors. Such research is clearly an exciting potentiality, rather than a reduction, because it cannot stand on a single 'disciplinary' leg; both neurological science and literary analysis are vital players here. In fact, Cohen reports, graduate students in literature see this integration not as a hostile takeover, but as an important means of supplementing literary scholarship, a means of "triangulating" knowledge via interdisciplinary cooperation. And so, once again, it cannot be stressed enough that, whatever our field or preferred subject matter, we are all of us working toward the same end; and while all of us have valid connections to make with each other's work, we could never usurp each other's territories completely. Of course, such an undertaking is only possible if scholars are aware of each other's work: if literature were really assumed to have nothing to say about science, or vice versa, this project could not have sprung from the modern university system.

Not only that, but there is absolutely no solid *historical* basis for this modern false dichotomy. Because if we follow the record back to the time and place when the sciences were first beginning to break away from a humanities/religion-based curriculum in the western university, and examine the original words written by a few of the monoliths who spoke for each 'side,' we find that there was never so extreme a difference of opinion to suggest the palpable, volatile fission we assume today. To what, then, may we attribute the bitterness we now experience? Surprisingly (or perhaps not), a great deal of academic strife arose from a dispute over morality: whose magisterium was authorized to teach it, and which discipline could cite its own inner workings as ethical prescriptives.

With the slack in religious morality-as-academic-endeavor in the mid-to-late twentieth century, however, this warfare became attributable to a very real struggle over critical theory, over who had the power to explain the human condition as removed from tenets of western ethics. Currently, however, science has once again begun to explore the very scientific bases of human social codes, thus bringing it full circle with the efforts of humanities departments and demonstrating the clear continuity of academia. But, as we will also see, a major cause of this supposed conflict is due only to those twin ubiquitous human weaknesses, mutual misunderstanding and willful ignorance.

In my thesis, then, I will challenge the popular perception of a true conflict between science and the humanities, reconsidering the original dialogue between Darwin's formidably loyal bulldog, the mighty T.H. Huxley, and the eternally eloquent Matthew Arnold, who, though they are often stereotyped, both believed that the only way to forestall humanist paranoia and promote scientific acceptance is comprehensive *mutual* education--and that, truly, the door swings both ways. (Hopefully my own deep-cover foray into a 'hostile' field will demonstrate the possibility of such things!!!) I will also point out that, for those consilient writers hoping to attract enquiring humanists, there is more than one way to skin a cat: I explore Gould's *The Hedgehog, The Fox, and the Magister's Pox* (2002) and Wilson's *Consilience* (1998) as eloquent modern texts, authored by two brilliant contemporary scientists, that reveal how and how *not* (under any circumstances) to approach this supposedly tortuous reconciliation. I will point out that, unfortunately, Wilson's brilliant but abrasive 'consilience' offers only what many humanists

perceive to be a violent conquest of their discipline by those sciences more empirically advanced, resulting in total absorption of the weaker, less geopolitically aware, combatant. I will thus be Gould's doberman in upholding his humanistically embracive prose as the most sober, grounded, welcoming, and realistic schema for reconciliation currently available on the popular science/consilience market, one which ensures the dignity and longevity of both disciplines (It should be noted, of course, that I clearly disagree with his model of completely non-overlapping magisteria [NOMA], in which the branches of learning deal in utterly disparate realms of study and should go separately, if equally, about their business.) I will also explore how, in his writing, Gould embodies the scientific rhetorical stance of 16th century essayist Michel de Montaigne, and why this represents a true synthesis of the physical and human sciences. I will also probe ways in which the scientific perspective is already making successful inroads into literary theory, and verse-versa: to do this, I will present the interesting case of Donna Haraway, who, as both scientist and critical theorist, foreshadows a potential fusion of theory between both disciplines. I will also poke my nose into religious discourses by popular practitioners of physical science (such as Carl Sagan and Richard Dawkins), which, as the first set of disciplines to be decoupled from the study of ethics and religion, are now becoming a major epistemological force rivaling even theology in its approach to human morality, thereby demonstrating the continuity of knowledge. Finally, I will re-examine the disciplinary status of the rhetoric of science, to point out what it does and does not teach us about science as a field, and why, for the most part, it illustrates important and guiding principles,

utterly in line with the continuity of the sciences, that will prove crucial in ensuring the safety and acceptance of our human scientist (kissing?) cousins as they are officially welcomed back to the world of physical science. (And, of course, vice versa.) Taken together, these texts will demonstrate how scientists themselves differ in their philosophical perspectives, that this evokes a model of science not rigid and exclusive, but flexible and open to comment from all branches of learning, and that this flexibility neither denigrates to subjectivity nor reifies to objectivity the physical sciences, but rather upholds them as one of an infinite series of Allen wrenches working together on a unilateral, conceptual level to understand the Universe.

CHAPTER 2

"WHAT WE HAVE HERE...IS A FAILURE TO COMMUNICATE." :

A BRIEF HISTORY OF AN INTERNECINE CONFLICT

"In these little bric-a-brac
A secret's waiting to be cracked
These dolls and toys confuse me so!
Confound it all! I *love* it though..."
-Jack, *The Nightmare Before Christmas*

"Louis, Louis...always *whining,* Louis...I've had to *listen* to that, for *centuries."*
-Lestat, *Interview with the Vampire*

On May 7, 1959, a scientist-cum-novelist by the name of Charles Percy Snow delivered a Cambridge Rede lecture that would electrify and enrage a generation of scholars. *The Two Cultures and the Scientific Revolution,* originally titled *The Rich and the Poor* (itself a telling metaphor for the model of the idle, decadent intellectual and hard-working blue-collar scientist he was to imply), Snow's lecture was delivered in a jocular manner, almost on a whim--but it was received with fear, loathing, and outright anger. Thus, "The Two Cultures Controversy" was born, the self-fulfilling prophecy of a mutually discordant model for the increasingly scrutinized relationship between scientists and humanists in the modern university. It would be popularly remembered as the first text to highlight the increasingly incomprehensible gap between the disciplines, and to paint this divide as a battleground red with the blood of both:

> Literary intellectual at one pole--at the other scientists, and as the most representative, the physical scientists. Between the two a gulf of mutual incomprehension--sometimes (particularly among the young) hostility and dislike, but most of all lack of understanding. They have a curious dis torted image of each other. Their attitudes are so different that, even on the level of emotion, they can't distinguish much common ground. (Snow 4)

And, tragically:

> There seems to be no place where the cultures meet. I am not go ing to waste time saying that his is a pity. It is much worse than that. Soon I shall come to some practical consequences. (16)

But Snow was, in his mind, a man of science as well as a novelist, with the somewhat understandable biases of an early 20th century scientist. He would therefore be remembered for leveling the charge that "Intellectuals, particularly literary intellectuals, are natural Luddites [with] no interest in the industrial revolution" (22), "or, for that matter, the scientific one" (Snow saw this latter disputed term as a "valid, if fuzzy, distinction"[29]). He would be remembered for rejecting the "snobbish and nostalgic social attitudes" (Collini *xxiii*) of the modern humanist, casually characterizing them as playing haughty skeptic to the scientist's optimistic inclusivity. And he would be remembered for claiming "in provokingly stark terms, that education in physics or chemistry is better preparation for handling the world's problems than an education in history or philosophy" (Collini *lxx*). Taken together, Snow's perception of the humanities adds up to a pretty damning portrait of the 'strangers' across the quad; not only are they ignorant of higher empirical Truths; they are smug about it. As Newman's *Cool Hand Luke* declared (ap

propriately enough, just before being shot in the neck), "What we have here...is a failure to communicate."

Of course, the humanist 'intellectual' reaction was one of deep and sincere offense. Beginning in February of 1962, English literary critic A.R Leavis let fly a series of bitterly personal anti-Snow polemics, starting with his own Cambridge Richmond lecture, *Two Cultures? The Significance of C.P. Snow* (as transcribed in his *Nor Shall My Sword: Discourses on Pluralism, Compassion, and Social Hope* [1972]). In it, Leavis declared:

> If confidence in oneself as a master-mind, qualified by capacity, insight and knowledge to pronounce authoritatively on the frightening problems of our civilization, is genius, then there can be no doubt about Sir Charles Snow's...The peculiar quality of Snow's assurance expresses itself in a pervasive tone; a tone of which one can say that, while only genius could justify it, one cannot readily think of genius adopting it.....The judgement I have to come out with is that not only is he not a genius; he is intellectu ally as undistinguished as it is possible to be...Snow is in fact portentously ignorant. (41-42)

Zing! I want to run for the band-aids just having *read* it--because one has to admire, or at least respect, Leavis' downright gumption. But the close-honed *nastiness* doesn't end there: Leavis also makes a sharp lunge at the jugular of Snow's attempts at interdisciplinarity, making a particular point of denigrating his scientific background so as to equate it with his 'impoverished' writing style and 'intellectual insignificance':

> Snow's relation to the age is of a different kind; it is characterized not by insight and spiritual energy, but by blindness, unconsciousness and automatism...He doesn't know what he means, and doesn't know he doesn't know...The lecture [*The Two Cultures*], in fact, with its show of giving us the easily controlled spontaneity of the great man's talk, exem plifies kinds of bad writing in such richness and so significant a way that there would, I grant, be some point in the schoolmaster's using it as a text

> for elementary criticism...Explaining why he should have cut short a brilliant career (we are to understand) as a scientist, he tells us that it had always been his vocation to be a writer...[but] as a novelist he doesn't exist; he doesn't begin to exist. He can't be said to know what a novel is...And I have to say now that in *The Two Cultures and the Scien tific Revolution* there is no evidence, either. The only presence science has is as a matter of external reference, entailed in a show of knowledgeable ness. Of qualities that one might set to the credit of scientific training there are none. As far as the internal evidence goes, the lecture was con ceived and written by someone who had not had the advantage of an intellectual discipline of any kind. (44-45)

Leavis believed Snow unworthy of speaking to the issue because he lacked thorough humanistic training. However, read today, his attitude towards academics and laymen seems contradictory. He believed that universities are necessary, but stated that "the academic is the enemy and that the academic *can* be beaten" (63). (Some explanation for this may be found in his bitterness over his own hard-won defense of the modern poets [like Eliot], which he felt forced to enact in the face of the pedantic Cambridge 'ancients'.) However, when contemporary literary critics, such as Lionel Trilling, attempted to naysay or accuse of him of harboring animus toward Snow, they were disparaged as being "guilty of *la trahison des clercs*...[and harboring an] attitude would make the essential work of the critic today impossible...[which] belongs to the ethos I was intent on challenging" (67). Once again, Leavis was drawing a line in the sand, declaring that anyone not in line with his views was against him; further, if they weren't, they were not a true humanist. In another essay, entitled "'Literarism' versus 'Scientism,'" Leavis describes science education as coming, by necessity and without exception, "with a dismissal of the great creative writers of the nineteenth century and later" (140). Further, Leavis saw

technology--which he equated with the advancement of scientific education-- as being fundamentally harmful to human dignity: he loathed the technologist vision of visionaries like H.G. Wells and believed that the 'egalitarian' "'social hope'" they promised was "unintoxicating...the vision of our imminent tomorrow in today's America: the energy, the triumphant technology, the productivity, the high standard of living and the life-impoverishment--the human emptiness; emptiness and boredom craving alcohol--of one kind or another" (60). He claimed he was "not a Luddite", yet believed "the advancement of science and technology means a human future of change so rapid...and insidious in their consequences, that mankind--this is surely clear--will need to be in full intelligent possession of its full humanity...a basic living deference towards that which, opening into the opening as it does into the unknown and itself immeasurable, we know we belong" (60). But not everyone could join this cultural vanguard: Leavis preferred to exclude from the universities those "students facing university requirements whom it would have been desirable to exclude as not qualified for university work" (150); those social theorists and politicians (such as reformer Lord Robbins) who believed in education for all were "Destroyers" of the proper university ethos, philistines with "no perception for what is being destroyed" (149).

But Leavis' highly elitist *jack of all trades is master of none* rhetoric didn't stick; because his challenge attacked Snow and not his argument, it did little to dispel the notion of a departmental conflict, and was, ironically, "read as its ultimate confirmation" (Ortolano 3), an eloquent proof of virtually all of Snow's claims about humanists. Even

more ironically, neither participant could be painted as being representative of one side or the other: according to Guy Ortolano's groundbreaking *The Two Cultures Controversy: Science, Literature and Cultural Politics in Postwar Britain* (2009):

> the arguments and participants in the controversy refuse to align along disciplinary lines. Snow, after all, had not practiced science for nearly a quarter of a century, and when he delivered the Rede lecture his stature rested upon his work as a novelist...Leavis, for his part, spent his career attacking not physicists and biologists but writers and critics, and his Richmond lecture directed its fire not against Snow's proposals for sci ence but at his stature as a novelist. The arts-vs-sciences dichotomy similarly fails to explain the positions in the wider debate. (4)

Flaring humanist and scientific tempers, having learned from history the necessity of defending their respective claims to the death against an unseen enemy (lest they be declared cultural infidels and placed under house arrest) had, in their haste to draw the battle lines, obscured the true nature of the issue. This was unfortunate, because although Snow would later publicly retract some of his statements in the light of 'humanist outcry' against the central tenets of his thesis ("The Two Cultures: A Second Look," London *Times Literary Supplement* 1963), most scholars, understandably blinded by this traditional (but mostly bogus) animosity, had missed Snow's main lament:

> It is dangerous to have two cultures which can't or don't commu nicate. In a time when science is determining much of our destiny, that is, whether we live or die, it is dangerous in the most practical terms. (Snow 98)

For Snow, the issue was not the supremacy of science over the arts; instead, he spoke to the very real set of problems posed by an academic society in which scholars remain irrevocably sealed within their own disciplines. Snow saw these (and quite rightly, too) as

a recipe for disaster, one which would prevent Britain from recovering from the devastation of World War II and rising again to global economic prominence. Nor did Snow really perceive things in the crude, dichotomous light of which he is often accused: he was the first to recognize that "The number 2 is a very dangerous number: that is why the dialectic is a dangerous process" (9). Further, the "curious" and perfect "storm" (as Lionel Trilling would phrase it) engendered in the hearts and minds of a few knee-jerk reactionaries worked to obscure Snow's central, and very hopeful, message: that with a little elbow grease and goodwill, the 'two' cultures can usher in the existence of the 'third' culture, a mutually profitable culture, a culture in which petty discord is abandoned in favor of collaboration and constructive dialogue. "When it comes," said Snow, " some of the difficulties of communication will at last be softened..the focus of this argument will be shifted, in a direction which will be more profitable to us all" (71).

Snow believed that the only way to achieve such an atmosphere was through the advent of a liberal education. Read in this light, it really is easy to see Snow's argument as primarily educational, a simple "rehash[ing] of the much more genteel debate conducted between Mathew Arnold and T. H. Huxley in the 1880's" (Sandbrook 2006, qtd in Ortolano) over the place and prominence of science in the gradeschool and college curriculum. As Ortolano points out, "His lecture called for a revolution in scientific education--not as an end in itself, but as part of an ambitious program of domestic modernization and global industrialization (4).

But what of his predecessor, the great T.H. Huxley? I recently had the pleasure of perusing a beautifully preserved 1899 2nd edition of his collected essays in the Renne Library; many of the pages hadn't even been cut (luckily, those essays pertaining to my subject had, for I couldn't, in good conscience, have done it myself). As it turns out, Huxley, too, believed that

> no boy or girl should leave school without possessing a grasp of the general character of science, and without having been disciplined, more or less, in the methods of all sciences; so that, when turned into the world to make their own way, they shall be prepared to face scientific problems, not by knowing at once the conditions of every problem, or by being at once able to solve it; but by being familiar with the general cur rent of scientific thought, and by being able to apply the methods of science in the proper way, when they have acquainted them selves with the conditions of the special problem. (122-123)

In short, a scientific education forges an informed, well-adjusted citizen. Omit the comprehensive study of the magisteria of science (most especially biology), however, and you leave him condemned to a vale of ignorant tears:

> Leave out the Physiological sciences from your curriculum, and you launch the student into the world, undisciplined in that science whose subject-matter would best develop his powers of observation; ignorant of facts of the deepest importance for his own and other's welfare...which might serve to check and moderate that phase of despair through which, if he take an earnest interest in social problems, he will assuredly sooner or later pass. (65)

For Huxley, as with Snow, scientific education "cannot be replaced by any other discipline whatsoever," for it alone "bring[s]..the mind into direct contact with fact, and practis[es] the intellect in the completest [*sic*] form of induction; that is to say, in drawing conclusions from particular facts made known by immediate observation of Nature"

("Scientific Education: Notes of An After-Dinner Speech" *Science and Education* [2nd Ed, 1899] 126). He believes science to be a means of improving socioeconomic conditions in Britain, and that neither "nations or individuals will really advance, if their common outfit draws nothing from the stores of physical science" ("Science and Culture" 144). But he makes a point of removing his magisterium from "that modern Manichean doctrine, which exhibits the world as a slave-mill, worked with many tears, for mere utilitarian ends" ("Of the Natural History Sciences" 63), declaring that science is profoundly humane and cultural as well, exposing Nature's "lavish beauty--the secret and wonderful harmony which pervades them [living things] all, from the highest to the lowest" (62) and becoming a means of exploring "our finer feelings, as the greatest of all sources of that pleasure which is derivable from beauty" (63). He also sees science as something more immediately useful: a "*trained and organised common sense*" (45), as well as a means of understanding and appreciating culture. Speaking at the opening of a new college of science, he declares that:

> Within these walls, the future employer and the future artisan may sojourn together for a while, and carry, through all their lives, the stamp of the influences then brought to bear upon them. Hence, it is not beside the mark to remind you, that the prosperity of industry depends not merely upon the improvement of manufacturing processes, not merely upon the ennobling of the individual character, but upon a third condition, namely, a clear understanding of the conditions of social life, on the part of both the capitalist and the operative, and their agreement upon common principles of social action. ("Science and Culture" [1880] 158).

So science can help us understand ourselves as social creatures, as well. But despite his occasionally negative interpretations, Huxley does not see culture as being produced by

science alone: literature is as much a necessary (and understudied) component of education as physical science:

> Literature is not upon the College programme; but I hope some day to see it there. For literature is the greatest of all sources of refined pleasure, and one of the great uses of a liberal education us to enable us to enjoy this pleasure. There is scope enough for the purposes of liberal education in the study of the rich treasures of own language...But there is no reason why French and German should not be mastered sufficiently to read what is worth reading in those languages with pleasure and with profit. (108)

What Huxley really seems to be passionate about, however, is the study of history; being, like Gould, a paleontologist, he is keen to extoll the values of philology and history as "a great section of the paleontology of man; and I have the same double respect for it as for other kinds of paleontology" (98). He warns, however, that to teach this subject with the same pedantic fervor with which 'many of the Greek and Latin classics and critical theory are dealt' would be to thoroughly ruin it for the pupils, making them believe its practitioners and afficionados to be "the greatest idiots the world ever saw" ("A Liberal Education and Where to Find It" 101). To avoid this, it is important to instill upon the student a working knowledge of "spontaneous [biological] change" (41), an interesting foreshadowing of Gould's own love of contingency, non-determinism, and unpredictability. (Of course, one may well argue that Huxley and Gould, located, as they are, across a century of discourse, are not really operating on the same historical level, and cannot be interpreted as being analogous; after all, Huxley believed in the superiority of the white race over all others, while Gould spent much of his career refuting that claim. But while this is true, I choose to refute the claim by pointing out that Huxley's educational argument *is*

a basis for the ethos of the modern interdiscplinary university, and thus bears every relation and relevance to modern scholarship.) Again, for Huxley, all fields of study are necessary (allbethey freshened a bit) for the balanced development of young minds. "It is not a a question of whether one order of study or another should predominate," he declared, "It is a question of what topics of education you shall select which will combine all the needful elements in such due proportion as to give the greatest amount of food, support, and encouragement to those faculties which enable us to appreciate truth" (179-180).

Egalitarian as Huxley was in his interdisciplinarity (and even, if we really dig, a somewhat enlightened attitude toward women and minorities), however, his stance on literary theory would leave many critics shaking in their sweater-vests. He agrees that "a criticism of life is the essence of culture...yet strongly dissent[s] from the assumption that literature alone is competent to supply this knowledge" ("Science and Culture" 142-143). According to Huxley, science has become so crucial to man's understanding of his place in nature that literary theory alone simply cannot suffice to explain...*erm*, anything at all, really*:* Huxley believed that "an army, without weapons of precision and with no particular base of operations, might more hopefully enter upon a campaign on the Rhine (a nice historical irony), than a man, devoid of a knowledge of what physical science has done in the last century, upon a criticism of life" ("Science and Culture" 144). Scholar Benjamin Cohen, in his examination of the historical disciplinary conflict, draws a similar conclusion:

> with the observation that the literary humanities' monopoly on underlying that culture was no longer tenable by the late 19th century. The age of the humanist was appropriately rendered during the Renaissance, Huxley ob served, but in the daily life of the 19-century citizen, natural knowledge, forced to the fore by the physical sciences, influenced the theory of life. To capture it succinctly, "the pretensions of our modern Humanists to the possession of the monopoly of culture and to the exclusive inheritance of the spirit of the antiquity must be abated, if not abandoned" (p. 152). [qtd in Cohen 284]

No wonder my first critical theory professor had been so incensed when I brought up the principles of science writing in her presence: scientists have been demanding that literary theory allow itself to be informed by scientific principles for over a century (and probably longer). If I were a full-time critic with a total disdain for science, I'd feel threatened too. This, then, is the crux of the whole conflict: whoever controls theory--they who can explain why humans do what they do and want what they want--is believed to control the discourse of human culture. If you dominate what is being said about human culture, you control the university. And if you control the university, you hold sway over the entire intellectual world. Again: if you can explain it, you can control it. And *that* is a powerful position, indeed; being aware of it offers similarly powerful insight into the motivations and stratagems of writers on both sides of the divide, as it is for this mental plateau, this narrow intellectual perch, that academics, who, though they may only be acting in a reactionary fashion to perceived attacks on their 'turf,' are playing king of the hill. But it doesn't have to be that way.

Because Huxley was not without some opposition: much of what he had written came as a reaction to an educational philosophy put forth by a university lecturer by the name of Matthew Arnold. Arnold argued that, rather than teaching sciences and humani ties as separate disciplines, science could be readily taught, and with the same essential techniques, as literature; in a word, their products could both be viewed as texts. Now obviously, teaching biology or chemistry without the sort of more rigorous data collection techniques unique to it would be grossly limiting; however, Arnold was absolutely correct in intimating that science and literature are fundamental reflections of the same human quest for knowledge and understanding. Though he is often condemned as being a key proponent of the division between 'high' and 'low' culture, he was interested in all learning, believing, as he did, that "All knowledge is interesting to a wise man, and the knowledge of nature is interesting to all men." However, he feared that the advent of scientific education would result in an unfortunate dwindling of literary knowledge; that it would prevent nascent scholars from fully understanding the world around them. In a revised and reprinted version of his own 1882 Rede Lecture (though he was an Oxford man, Cambridge seems to be a hot spot for this particular issue), entitled "Literature and Science," Arnold wrote that he had often been (and, sadly, still is, largely due to selective, superficial citation) misinterpreted as believing merely that literary analysis alone was enough to sustain intellectual endeavor:

> Some of you may possibly remember a phrase of mine which has been the object of a good deal of comment, an observation to the effect that in our culture, the aim being to know ourselves and the world, we have, as the means to this end, to know the best which has been thought and said in the

> world. A man of science, who is also an excellent writer and the very prince of debaters, Professor Huxley, in a discourse at the opening of Sir Josiah Mason's college at Birmingham laying hold of this phrase, ex panded it by quoting some more words of mine, which are these: "The civilised world is to be regarded as now being, for intellectual and spiritual purposes, one great confederation, bound to a joint action and working to a common result, and whose members have for their proper outfit a knowledge of Greek, Roman and Eastern antiquity, and of one an other. Special local and temporary advantages being put out of account, that modern nation will in the intellectual and spiritual sphere make most progress, which most thoroughly carries out this programme." Now on my phrase, thus enlarged, Professor Huxley remarks that when I speak of the above-mentioned knowledge as enabling us to know ourselves and the world, I assert literature to contain the materials which suffice for thus making us know ourselves and the world. ("Literature and Science" August 1882)

He then goes on to add, of course, that such a hard-line stance was not his objective, at all. In fact, in his original lecture, Arnold claimed that literary study is more than a blank appreciation of beautiful words; it is not an elite triviality because it is, in fact, scientific in nature, rather than abstractly ornamental:

> What Professor Huxley says, implies just the reproach which is so often brought against the study of belles lettres, as they are called: that the study is an elegant one, but slight and ineffectual; a smattering of Greek and Latin and other ornamental things, of little use for any one whose object is to get at truth... And there is always a tendency in those who are remon strating against the predominance of letters in education, to understand by letters *belles lettres*, and by *belles* [220] *lettres* a superficial humanism, the opposite of science or true knowledge. But when we talk of knowing Greek and Roman antiquity, for instance, which is what people have called humanism, we mean a knowledge which is something more than a superficial humanism, mainly decorative. 'I call all teaching *scientific*,' says Wolf, the critic of Homer, 'which is systematically laid out and fol lowed up to its original sources. For example: a knowledge of classical antiquity is scientific when the remains of classical antiquity are correctly studied in the original languages.' There can be no doubt that Wolf is per

> fectly right, that all learning is scientific which is systematically laid out and followed up to its original sources, and that a genuine human ism is scientific. (“Literature and Science” 1882)

So--here was a man who understood, like many of my younger colleagues in the sciences and humanities (and counting), that learning was not a dichotomous process tending to wards increased insularity and specialization, but a singular, continuous effort towards understanding what it means to be human in this strange and wonderful universe:

> When I speak of knowing Greek and Roman antiquity, therefore, as a help to knowing ourselves and the world, I mean more than a knowledge of so much vocabulary, so much grammar, so many portions of authors, in the Greek and Latin languages. I mean knowing the Greeks and Romans, and their life and genius, and what they were and did in the world; what we get from them, and what is its value. That, at least, is the ideal; and when we talk of endeavouring to know Greek and Roman antiquity as a help to knowing ourselves and the world, we mean endeavouring so to know them as to satisfy this ideal, however much we may still fall short of it. The same as to knowing our own and other modern nations, with the aim of getting to understand ourselves and the world. (221)

Arnold, then, was neither ancient nor modern: he believed in eternal, uninterrupted study of all that had been said and done in human history. Science, math, literature, philosophy, all were one, and one were all: they amounted to a singular, profoundly human text, these composite materials of which “are not isolated, but there is in the generality of mankind a perpetual tendency to relate them one to another in divers ways.” Canny old man--he was even known for declaring, while at Cambridge, “though not without an apology for my profaneness, to hazard the opinion that for the majority of mankind a little of mathematics, even, goes a long way” (“Literature and Science” 1882).

In this regard, then "There is, therefore, really no question between Professor Huxley and me [Arnold] as to whether knowing the great results of the modern scientific study of nature is not required as a part of our culture, as well as knowing the products of literature and art" ("Magazine" 1882). However, the tendency to oversimplify and polarize the arguments of one academic side or the other led, then as know, to distinct unpleasantness and hurt feelings which, in turn, engendered retaliatory oversimplification. Arnold was hinting at this when he announced that "there does arise a question between those whom Professor Huxley calls with playful sarcasm 'the Levites of culture,' and those whom the poor humanist is sometimes apt to regard as its Nebuchadnezzars" ("Magazine" 1882). For Arnold styled himself, first and foremost, as a gracious enquirer into the sciences, who was badly shocked when its citizens repelled him with charges of ignorance and outsiderism. Consequently, like many scholars, he resented his perception of having been painted a cultural philistine, and did his utmost to clarify his perspective.

Because for Arnold, literary study was not a paternalistic, dogmatic device intended to subdue the 'beleaguered' sciences; it was simply, like the physical sciences themselves, one of the observational methods used to create knowledge. "Human nature is built up by these powers," he said, "[and] we have the need for them all." But Arnold recognized that not all of these 'powers' could translate into knowledges which may be "directly related to the sense for beauty, to the sense for conduct." These, he believed, "are instrument-knowledges; they lead on to other knowledge, which can." Though the natural sciences "do not stand on the same footing with these instrument-knowledges,"

the inherently scientific practices of literary criticism can experiment in those minute, nuanced crevasses where the more empirical sciences sometimes simply cannot fit. Even though all human beings "seek naturally to combine the pieces of our knowledge together, to bring them under general rules, to relate them to principles," there are still pieces that cannot be collated under an integrative academic TOE. But even these lists of exceptions, those concepts which "stand isolated in our thoughts, [still] have their interest" as objects worthy of study. And though Arnold thoroughly (and rightly) resented the charge that the humanities represented only a vestige of *jejune,* medieval educative practices, he recognized that, on the other hand, the physical 'hard' sciences can be helpful in sweeping away the harmful, superstitious cobwebs that lurk still in the minds of men. Because ultimately, he believed, such enlightenment would benefit all branches of learning:

> And the more that men's minds are cleared, the more that the results of science are frankly accepted, the more that poetry and eloquence come to be studied as what they really are–the criticism of life by gifted men, alive and active with extraordinary power at an unusual number of points; so much the more will the value of humane letters, and of art also, which is an utterance having a like kind of power with theirs, be felt and acknowl edged, and their place in education be secured. ("Literature and Science" 1882).

Not surprisingly, these words are just as apt today as at the turn of the century, and really need no notation from my end to prove the point that mutual and comprehensive education is drastically necessary to obviate the internecine strife we, as an inherently intellectual human civilization, have so often experienced, particularly in the latter half of the

century. Because though Arnold clearly preferred the literatures (and what professional man of letters *wouldn't*), and was more than prepared to rise fiercely to its defense, he had nothing but respect and brotherly consideration for the physical sciences, and wished them to be included in all educational programs. And so I will end this section, appropriately enough, with more Arnold, and give him (for the moment, anyway) the last hurrah, in all its unedited glory:

> Let us, all of us avoid as much as possible any invidious comparison be tween the merits of humane letters, as means of education, and the merits of the natural sciences. But when some President of a Section for Me chanical Science insists on making the comparison, and tells us that 'he who in his training has substituted literature and history for natural science has chosen the less useful alternative,' let us say to him that the student of humane letters only, will at least know also the great general conceptions brought in by modern physical science; for science, as Professor Huxley says, forces them upon us all. But the student of the natural sci ences only, will, by our very hypothesis, know nothing of humane letters; not to mention that in setting himself to be perpetually accumulating natu ral knowledge, he sets himself to do what only specialists have the gift for doing genially. And so he will be unsatisfied, or at any rate incomplete, and even more incomplete than the student of humane letters. ("Literature and Science" 1882)

Any way you slice it, hard-line ignorance and petty, dismissive rhetoric will eventually bite you in the ass (I bet you can see where I'm going with this, but more on that later, in chapter 5). It should be clear by now that, contrary to popular belief, the supposed 'conflict' between the sciences and the humanities did not start out that way. Unfortunately, however, Leavis did much to polarize the debate in the minds of the world, which resulted in 1) scientists regarding humanists as dangerous timebombs best given a wide intellectual berth and 2) humanists who believed scientists were out to usurp, disprove, and

finally abolish their livelihood, a set of stereotypes which would catalyze the achievement of some truly dizzying heights of intellectual nastiness in the nineteen-sixties, primarily because, being understandably concerned about this state of affairs in the aftermath of Leavis' rampage, many scientists sought to publish texts that purported to obviate the snarling humanist ego they believed to be barking up their tree. But this only made things worse. *Much* worse. For with the publication of Paul Gross and Norman Levitt's *Higher Superstition: The Academic Left and Its Quarrels with Science*, 1994 saw the outbreak of 'the science wars'. The title says it all, really. Recall that it is not 'Science and Its Quarrel with the Academic Left,' but rather *The Academic Left and Its Quarrel with Science,* suggesting that (in the manner of all sibling conflicts) the 'academic left' *started it.* However petulant though it seems, the title does indicate a humanistic precedent for addressing science. Taking the defensive position as a battlestation, the biologist-mathematician dynamic duo lit into the side of postmodern theory--which they saw as being representative of all humanist critiques on science, whether literary, cultural, or feminist--with an almost unprecedented crocodilian ferocity, rotating around a hard-line scientific axis and tearing huge chunks from the collective humanist backstrap. Postmodernism they characterize as "too variegated and shifty to allow easy categorization" (71), an "inherently futile, self-deceptive, and worst of all, *oppressive* [oh, *snap!*]" doctrine completely "antithetical" to the project of the Enlightenment" (72). It is a conglomeration of useless, *abstract* intellectualism,

> hold[ing] that all knowledge is local, or "situated," the product of interac tion of a social class, rigidly circumscribed by interests and prejudices, with the historical conditions of its existence. There is no knowledge, then; there are merely stories, "narratives," devised to satisfy the human need to make some sense of the world. In doing so, they track in unac knowledged ways the interests, prejudices, and conceits of their devisers. On this view, all knowledge projects are, like war, politics by other means. (72)

Gross and Levitt were correct in claiming in that science is often better at avoiding blatant political entanglement than the theory of many human sciences, because the process of scientific testing and analysis can be practiced in a vacuum: drug testing will deliver scientific results regardless of whether the head practitioner is a liberal or conservative. A stem cell behaves the same way under a microscope for a fundamentalist Christian or a biomedical researcher. What Gross and Leavitt failed to see, however, is that the way that data is interpreted may vary greatly. A crooked doctor can selectively interpret the numbers while an honest one may not, and reach the opposite conclusion; a fundie (fundamentalist Christian) may see the beautiful work of a divine watchmaker, the manipulations of which amount to blatant sacrilege, while the biologist sees the elegant product of millions of years of natural selection, one which may be used to improve millions of lives. Both the crooked doc and the fundie are clearly and demonstrably wrong, of course. Their perspective is political, not scientific: the straight doc and the biologist, on the other hand, are pursuing empirical science. The sticky wicket, however, comes in a consideration of *why* they are doing it. Perhaps the doctors are testing to see if a highly lucrative drug (like Yaz birth control) really causes deep-vein thrombosis. But who is employing them? Is it the FDA? An independent research agency? The Bayer Pharma

ceutical Corporation? Has the biomedical lab been shut down by some ridiculous, religiously (and therefore politically)-motivated political sanction? Viewed in this light, it becomes easy to see how quickly politics can influence the direction of certain sciences. And neither are Gross and Levitt impervious to this, though they frame it on a smaller scale, and are, of course, careful to qualify it:

> No serious thinker about science, least of all scientists themselves, doubts that personal and social factors influence problem choice and the accep tance of results by the scientific community. Few serious thinkers about science, however, outside the camps of feminists and social constructiv ists, argue that the stable results of science, those that have been subject to empirical test over time and have survived, *are not written in nature*! Most know that whatever the underlying calligraphy, self-correcting science is the best translation of it we have. (130)

Gross and Levitt are only pointing out that science is the quickest, easiest means humanity has of understanding the physical world, seeing that, as primates, we are forced to view it through an encapsulated, self-enclosed brain. They point out, of course, that important advancements, will always eventually be made: without Watson and Crick, someone else (most likely Rosalin Franklin) would have discovered the structure of DNA. Without Darwin, the theory of natural selection would have been voiced by another naturalist; in fact, Wallace made the same critical connections at the exact same time (that's why we call it the Darwin-Wallace Theory of Evolution by Natural Selection). But although politics does not determine the outcome of science, it can fudge or obscure the results, set back major breakthroughs, and thereby attempt to disparage non-specialist opinions of the work being done. The true purpose of theory, then, is to point out how

these influences can affect our thinking and decisions (often on an unconscious level), and to propose ways to mitigate their effects. After all, scientists, too are human (even computers are based on the human brain--it's the only computational model we have), and we are heavily influenced by the social environments in which we learn and mature. And there is always the danger that pseudoscientists will claim science can justify racism, sexism, or other factually-unfounded social realities. This is why Gross and Levitt were somewhat misguided in claiming that the "idle phrases" (71) of humanistic theory have no absolutely nothing to say about the discourse of science. And, ironically, by consciously defining theorists as the "*academic left"* (9), and even though they recognize that not all such theorists are politically liberal, they perceive that they will surely be denounced "as disguised reactionaries and as apostles of right-wing malignity" (10), and therefore consciously choose to operate in the polarized realm of political shit-slinging, painting as liberal vs. conservative what should be a more politically neutral conversation (and besides, characterizing scientists--via this odd process of elimination--as political conservatives is, for most of us, nothing less than a serious and damning insult, not to be casually bandied about.) It may be true that science is not political; but this type of book is.

At any rate, other scientists soon hopped into bandwagon: quantum physicist Paul Sokal even went so far as to submit a fake conciliatory article, "Transgressing the Boundaries: Towards a Transformative Hermeneutics of Quantum Gravity" to *Social Text,* a postmodern academic journal at Duke University, arguing that the theory of

tum gravity is based on postmodern tenets. He did it to get the humanist's goat, hoping to demonstrate that if they were foolish enough to "publish an article liberally salted with nonsense if (a) it sounded good and (b) it flattered the editors' ideological preconceptions" ("A Physicist Experiments With Cultural Studies" 1996), their entire field was suspect as being a haven for meaningless, masturbatory discourse. The article was, of course, published, and when Sokal ripped away his disguise, some humanists were (and still are) outraged to learn of it.

Anyway, in the aftermath of this hilarious goat-rope, many of the intellectual descendants of the original players hoped to create a new unity, a movement toward the third culture Snow had attempted to usher in. For two key players in the science world, both tempered by liberal charges of scientific hegemony, this hopeful, carefully mediated relationship would center around *consilience*, a term coined in 1840 by a philosopher of science named William Whewell (pronounced ewe-ull) in *The Philosophy of the Inductive Sciences, Founded Upon Their History* (1837) to describe the 'jumping together' of seemingly disparate observations to create a recognizable, encompassing, useful theory. (Some readers may chuckle to learn that the word *scientist* has been around just as long, and was in fact created by the same man!) He introduces it thus, in a discussion of the utility of the inductive process:

> The Consilience of Inductions takes place when an Induction, ob tained from one class of facts, coincides with an Induction, obtained from another different class. This Consilience is a test of the truth of the Theory in which it occurs (qtd in Wilson 8)...Accordingly, the cases in which in

> ductions from classes of facts altogether different have thus *jumped to gether*, belong only to the best established theories which the history of science contains. And as I shall have occasion to refer to this peculiar fea ture in their evidence, I will take the liberty of describing it by a particular phrase; and I will term it the *Consilience of Inductions*. (230, qtd in Gould 207)

Contained within Whewell's seminal statement is, paradoxically, the germ of the interdisciplinary theses of *both* Wilson and Gould. Wilson took this as his cue to publish *Consilience* (1998), in which he engages Whewell's term as the avatar of 'The Dream of Intellectual Unity [which] first came to full flower in the original Enlightenment...A vision of secular knowledge in the service of human rights and human progress, it was the West's greatest contribution to civilization" (15). In an eloquent passage describing the 'project' of intellectual holism, Wilson admits that there are difficulties inherent in his proposal:

> The belief in the possibility of consilience beyond science and across the great branches of learning is not yet science. It is a metaphysical world view, and a minority one at that, shared only by a few scientists and phi losophers. It cannot be proved with logic from first principles or grounded in any definitive set of empirical tests, at least not yet by any conceived. Its best support is no more than an extrapolation of the consistent past suc cess of the natural sciences. Its surest test will be its effectiveness in the social sciences and humanities. The strongest appeal of consilience is in the prospect of intellectual adventure and, given even modest success, the value of understanding the human condition with a greater degree of certainty. (9)

As we shall see, however, Wilson's rational, reined-in attitude later broke free of its measured harness, quickly assuming the stance of a domineering yet admiring conquerer, utterly bewildered by the intractable nature of his worthy adversary (to me, the text resembles nothing so much as Peter O'Toole's epic portrayal of Lucius Flavius Silva in *Masada*, beseeching the stubborn Jews to surrender with dignity or be annihilated).

Gould, meanwhile, being a careful student of the humanities, was fairly quick about crafting his rejoinder, *The Hedgehog, The Fox, and the Magister's Pox* (tragically, it would only be published posthumously in 2002), which claimed that Wilson had incorrectly interpreted the term as a free pass for an all-encompassing reductionism that would one day lead to the treasured 'theory of everything,' in which disciplines aligned along a great chain of intellectual being. Gould pointed out that Whewell's envigorating calisthenics were, at the time, intended to apply only to the inductive sciences, and employed his great and famous watchword, *contingency*, to explain that the humanities cannot be reduced to additive properties because their internal workings are largely composed of historical *accidents*, and, as such, do not follow clean-cut, predictable laws (202). The sciences and humanities, for Gould, are literally apples and oranges; to counter what he saw as 'Wilson's dangerous idea,' Gould promoted instead the concept of Non-Overlapping Magisteria (NOMA), which proposed that science, the humanities, and religion were three utterly distinct and unbroachable intellectual fortresses that could not violate one another with impunity. But Gould, though he saw Wilson's usage of the term as a "failure," was nonetheless "delighted that Wilson has rescued, and restored to prominence, one of my favorite obscure words, indeed my longtime leading candidate for a term that should have stuck, but suffered apparent extinction instead--at least until Wilson lit the Phoenix's pyre" (203). Gould also--not surprisingly, given his enthusiasm for the term--cites a prior claim to the goldmine; intrigued as I am by the supposed 'feud' between Wilson and Gould, I am tickled by the page's footnote, in which Gould admits:

> something in myself that I can only deem petty, I was a bit peeved when Wilson chose *Consilience* as the title to his 1998 book. In my own work on the history and philosophy of science, with my particular focus on Darwin and the Victorian period in general, I had studied Whewell's con cept of consilience, and had used the term and idea prominently in to pa pers, as the centerpiece for describing Darwin's historical methodology (Gould, 1986) and in defending my own style of empirical documentation in a major monograph on the taxonomy of a particularly difficult group of land snail (Gould and Woodruff, 1986). I thought I was the only living evolutionary biologist who had ever discovered and used Whewell's term. (I guess I mention this to give readers ammunition for suspecting a personal motivation that might legitimately be called mean-spirited if you feel that I have gloated a bit too much in arguing that Wilson misconstrues Whewell's motives and intentions.) (203)

Gould was, of course, being facetious, but I feel it bears mentioning, because it illuminates two interesting points: 1) humanists aren't the only ones to pull their gloves off in service of defending their intellectual honor, and (more importantly, for humanists) 2) as we shall see, it wasn't only *his* honor Gould believed himself to be defending: humanist honor was at stake as well. The reason: Gould identified with one of the chief pillars of our discipline: 16th century essayist Michel de Montaigne.

CHAPTER 3

QUE SAIS JE? STEPHEN JAY GOULD AND THE HUMANISTIC FIELD TRIP FOR SCIENCE

In his introduction to *Dinosaur in a Haystack* (1995), essayist and evolutionary biologist Stephen Jay Gould hails Michel de Montaigne as founder of the literary essay. First published in 1580, Montaigne's collected *Essays* effectively set the template for this traditionally humanist genre. According to Gould, Montaigne's "original and defining strategy" results from "the marriage of alluring detail with instructive generality, all told with the stamp of an author's personal involvement" (*xi*); not surprisingly, this is the strategy Gould himself adopts, linking "lovely details into their own string, and then to the essay's generality as a truly helpful illustration, not a frill or indulgence--the dinosaur to the haystack" (xiii). The implications of this similarity, however, move well beyond mere structural mechanics. In adopting Montaigne's schema, Gould deconstructs popular conceptions of scientific intellectualism and authorship and establishes a perspective of science based not upon dry, empirical stereotype, but rather upon an unmitigated passion for learning (particularly history) and the pursuit of lateral interdisciplinary connection. Taken together, these reconstructions allow for what Gould terms the "humanistic field trip for science" (*Dinosaur* 7). The literary essay, in turn, becomes what its founder intended it to be: a dynamic, trial-and-error experimentation with one's own mind.

Citing Montaigne's short preface to his Essays, Gould expresses his desire to lay bare his mind; to appear naked, genuine, even ordinary before his readers:

> I desire therein to be viewed as I appear in mine own genuine, simple and ordinary manner...If I had lived among those nations which (they say) yet dwell under the sweet liberty of nature's primitive laws, I assure thee I would most willingly have painted myself quite fully and quite naked. (*Dinosaur* ix)

In acknowledging the rhetorical stance of his historical predecessor, Gould establishes himself as an everyman, a "meat-and-potatoes man...quite capable of releasing [his] own pepper from a shaker" (ix). He is "a tradesman, not a polymath" (ix), a phrase reiterated in each of his groundbreaking compilations. Montaigne, too, chooses to identify as a craftsman; the act of writing can be likened to "building a wall" from which he communicates "as Michel de Montaigne, not as a grammarian, a poet, or a lawyer" (*Essays* 236). Like Montaigne, whose stated "sole aim is to reveal myself" (*Essays* 52), Gould is perfectly willing to explore his status as "'freak' of literary nature" (*I Have Landed* 2) and to reveal the "constant joy that writing these essays has brought [him]" (4). Taking Montaigne's lead in dispelling all forms of authorial superiority, Gould frankly admits his own fallibility and (rare) ignorance; as the archetypal essayist has "committed some serious and grievous errors in [his] life" (*Essays* 246), so his modern protege has "frequently advanced wrong, or even stupid, arguments (in the light of later discoveries)" (*I Have Landed* 6). Recognizing his mistakes allows the reader to trace the evolutionist's own (intellectual) evolution: In *Bully for Brontosaurus* Gould reflects that he has certainly "become a better writer by monthly practice", often "wish[ing] that all copies of *Ever*

Since Darwin [his first publication] would self-destruct (13) owing to its "stylistic juvenalities" and lack of "the more personal style that I hope I developed later," eventually abandoning altogether the "blast and bumble" characteristic of so many of his colleagues (*I Have Landed* 4). Just as Montaigne refers frequently to his own boyhood education and maturation, so Gould, writing with "active passion," records how "[his] own essays have grown, shifted outward, and expanded focus...across my own transition from rebellious youth to iconoclastic middle age" (*Dinosaur* x). In many ways, then, Gould's work provides a field guide to the man himself, an unintentionally self-reflexive example of the "'mini intellectual biography' -- the distilled essences of the central motivations and concepts of interesting and committed scholars" (4) he crafts so successfully for other giants in his fields, which, as any Gould scholar knows, are legion. It should be remembered (it cannot be pointed out often enough) that Gould's prose is no mere subjective prattle; though lighthearted personality and sense of humor are ever in abundance, his facts are solid, his research methodology rigorous, original, and thoroughly scientific (Gould frequently laments that his colleagues in the 'hard' sciences remain reluctant to cite his anthologies [*I Have Landed* 7]). At the same time, however, Gould defies the stereotype of the scientific popularizer "concerned to press uncritically the romance of the intellectual life" (Lewontin and Levins 203); he displays a full chromatic range of emotion in regards to the academy, including, on occasion, frustration. Taken together, these aspects of Gould's writing allow for men as scientists (and humanists) to be seen not as faceless

automata, but as passionate individuals genuinely captivated by their subject matter, joyously probing Montaigne's own defining question: *Que sais je?* (What do I know?).

In order to emerge triumphant from such an essay (literally, a trial, attempt, or experience), both authors must to some degree orient their own minds, interests, and abilities as the subject of their work--the scientist placing himself under the microscope, so to speak. Montaigne declares that "I am myself the subject of my book" ("Preface" 1), though he admits that the portrait is far from constant:

> I cannot fix my subject. He is always restless, and reels with a natural intoxication. I catch him here, as he is at the moment when I turn my attention to him. I do not portray his being; I portray his passage...I must suit my story to the hour, for soon I may change, not only by chance but by intention. (*Essays* 235)

Montaigne's is a mind in flux, constantly testing itself, ever in search of novel self-revelation; each of his works is "simply a trial [essai] of [his] natural faculties" (159). Gould too possesses such a mind, relentless in its search for new material to challenge and occupy it, and incorporating a "humanistic focus" into the study of nature "gives an essayist a 'whole 'nother' level of juicy material" to work with (*Leonardo* 6). He characterizes himself an "essay machine; cite me a generality, and I will give you six tidbits of genuine illustration" (*Dinosaur* xii). Gould studies his own mind as much as anything else; often choosing to illuminate material by paired contrast, "the conjunction [that] de fines the essay as a genre," Gould "draw[s] connections in a manner that feels automatic to [him]" (*xii*). Such "intellectual promiscuity" (*Landed* 19) results in an uncanny ability to move "outward and onward by a network of lateral connections" (*Brontosaurus* 14)--

"Of Kiwi Eggs and the Liberty Bell" (*Brontosaurus* again) and "The Diet of Worms and the Defenestration of Prague" (*Leonardo*) rank as some of his more ambitious-sounding titles (and Gould was not without his critics, who hammered him on his usage of "hyperbole and incendiary language, even when he should have known better" [Allmon 15].) To achieve this, however, he is ever in search of what he terms "ligature" (*Leonardo* 12). More often than not, this ligature comes in the form of historical excavation (literally and figuratively).

For both Montaigne and Gould, the (traditionally humanist) study of history provides the strongest binder between details and generality. Interestingly enough, this disciplinary preference is also reflected in the structure of their essays; neither author adheres to strictly scientific explication, for, as Gould so eloquently enunciates, history, like science, is not a straight vertical line of progress (*Leonardo* 105). In his essay about the proper education of children, Montaigne unabashedly declares history (together with poetry) to be his "favorite pursuit" (50). As a quintessential humanist, Montaigne prefers the work of the historian because, in probing the lives of men, its study reflects his own trials:

> Historians give me a fairer service; they are easy and entertaining; and at the same time the man as a whole, whom it is my object to know, is more vividly and completely represented in their works than anywhere else...those of them that write separate lives, with what arises from within than with what arrives them without, suits me best of all. (168-9)

Montaigne has, for all intents and purposes, reiterated his own job description. Gould adopts the same tactic, defining his professional identity--that of the humanistic

naturalist--by the "history of how humans have learned to study and understand nature" (*Leonardo* 5). By way of justification, Gould points out that even organisms and their evolutionary pathways "are directed and limited by their past" (*Hen's Teeth* 65). As a paleontologist and evolutionary biologist, then, "[his] trade is the reconstruction of history"; therefore, he must also "examine modern results of historical processes and try to reconstruct the path leading from ancestral to contemporary words, organisms, or landforms" (*Panda's Thumb* 28), rather than adhering to the 'timeless' scientific method. Like Gould, Montaigne prefers to make use of historical examples "most unusual and memorable" (*Essays* 47). And like Gould, Montaigne prefers primary sources over secondary accounts: "The only good histories are those written by men who were themselves the head of affairs, or took a share in the conduct of them" (171); secondary sources, on the other hand, often "chew our food for us" and "fashion history to their own ideas" (170). Most contemporary scientists rely on secondary work for its authoritative stance on historical documentation; for Gould, however "any derivative working from secondary sources rather than primary monographs, would be a mark of disrespect for something truly beautiful" (17) and a disservice to historical accuracy. Gould is thus a consummate humanist; for him, historical research is "a thrill, whatever the outcome in personal enlightenment, to thus engage the greatest thinkers and doers of our past" (*Leonardo* 7). Unfortunately, in the academy, "Very few people, including authors willing to commit to paper, ever really read primary sources," thus guaranteeing "authorial passivity before

secondary sources, rather than active dialogue" (6). But Gould is nothing if not active; nor is this his sole criticism of the intellectual status quo.

To the humanistic naturalist, science is "an accessible, human activity, much like any form of creativity" (*Panda's Thumb* 13). Gould absolutely rejects the "stereotyped image" of the scientist who "rel[ies] upon experiment and logic" (27). Not for him the stereotyped role of "middle-aged man in a white coat...[who] pours two chemicals together and watches the answer emerge in a flask"; his is not a dry regimen of "Hypotheses, predictions, experiments, and answers" (27). His is not a world of fierce reduction or positivism. In fact, few academic concepts irk Gould more than the arbitrary ordering of 'hard' and 'soft' sciences:

> We shall never be able to appreciate the full range and meaning of science until we shatter the stereotype of ordering by status and under stand the different forms of historical explanation [including the humanities] as activities equal in merit to anything done by physics or chemistry. (*Wonderful Life* 281)

The 'hard' academic disciplines (Gould frequently refers to his lack of patience for the "unfortunate, but regrettably common, stereotype about science divid[ing] the profession into two domains of different status [*Brontosaurus* 496], and has sought to "break down the barriers between these two styles of science by fostering mutual respect" [497]) own no patent on the search for a deeper meaning to life's 'persistent questions'. Science, after all, is "no inexorable march to truth, mediated by the collection of objective information and the destruction of ancient superstition. Scientists, as ordinary human beings, unconsciously reflect in their theories the social and political constraints of their times" (*Ever*

Since Darwin 15). One would expect such a philosophy to be reflected in his work; Gould's prose does anything but march, and, like Montaigne's, is, if anything, more of a jubilant waltz in the general direction of personal revelation. If we hold Gould's writing to reflect a model of true (rather than stereotyped) science. scientists are demonstrated to be neither omnipotent nor objective--nor do they believe themselves to be.

Montaigne also lays out several significantly-more-than-minor (proverbial) 'beefs' with the academy-at-large, which seem to serve as the impetus for his iconoclastic writing style: for one, institutionalized "learning often enough mends the purse [particularly that of the institution], but seldom the mind" (*Essays* 292), resulting in scholars "powerless without their book" and irreversibly fettered by convention (190) a characteristic he detests, "If I may venture to say so, a little more than I do stupidity" (292). The "disputations of these professional logicians" are equated with "the gabblings of fish-wives" (291). But the greatest failure of the institution, for Montaigne, is the Master of Arts:

> Take a Master of Arts, and converse with him. Why does he not make us feel the excellence of his training? [**HAHAHA**] Why does he not strike women and ignorant people like ourselves with admiration for the sound ness of his reasoning, and the beauty of his ordered argument?...Let him drop his hood, his gown, and his Latin, let him stop battering our ears with his quite raw and undigested Aristotle, and you will take him for one of us, or worse. (291)

Rhetoric and artifice are the only means by which such a scholar can advance himself, but their "pedantic garrulity" (172) and "merely verbal tricks" will, upon close examination, "appear quite bodiless, they will scatter around a good [argument]" (315). Mon

taigne, as may be expected, avoids such methods like the plague (pun intended). Gould too abhors the "verbal trickery" employed by those "who can make white black, and black white" (*Dinosaur* 369). (On the other hand, Gould readily recognizes that the examination of rhetoric can provide valuable scholarly insights, even in his own work ["Fulfilling the Spandrels of World and Mind" 324].) At the same time, this 21st century scientist, who has "never been able to raise much enthusiasm for disembodied theory" (Hen's Teeth 16)--though he never simplifies nor spares details--also successfully "bypass[es] nearly all the crushing jargon of professional lingo" (*Wonderful Life* 17). Gould's writing is instead an honest portrayal of facts as they stand, devoid of the overly-nominal mystification of the academy of sciences to which many writers fall victim.

And rather than ensconcing himself in scientific anonymity, Gould adopts the typical Renaissance humanist strategy of radical transparency, adopting two additional tactics in situating his work between himself and the reader: the first is a bargain; the second is a bet. In the case of the bargain, though the essays may "require a bit more from you than the usual item of American journalism demands," he "would not write these essays any differently if [he] intended them for [his] immediate colleagues alone" (*Dinosaur xiv*). In other words, he "intend[s] [his] essays for professionals and lay readers alike"; he "will not make concepts either more simple or more unambiguous than nature's own complexity dictates" (*xiv*). (Apparently, however, such tactics carry over into Gould's disciplinary journal work [as opposed to essays] as well: according to Gragson and Selzer's analysis of "The Spandrels of San Marco," he "cue[s] [his] readers toward a

disciplinary role by identifying as [a] biological scientist;" overall, however, "the entire performance calls forth the reader's cosmopolitan self. It is as if the reader is being consciously removed from a scientific role and transformed instead to the broadly urbane reader implied in Smithsonian and Natural History" [193]). In return, the author promises a more nuanced (and infinitely more engaging) account of his subject matter.

Gould's second method of authorial identification is a bet. A poker bet, to be precise: as part of the 'modest proposal' prefacing Full House, he wagers the reader that, should he "Persist through to the end," he "will be rewarded (perhaps even with a royal flush to beat my full house)"--the work is appropriately "imbued with a promise that two truly puzzling phenomena can be explained by the conceptual apparatus here developed" (2). Montaigne, on the other hand, promises nothing, claiming in his own preface to have written "with no thought of serving you" (1); the book is instead written as a memento for family and intimate friends. Ostensibly, he can think of no reason why a reader "should waste [his] leisure on so frivolous and unrewarding a subject" (1). Overall, however, both writers intentionally set out to meet their reader on level ground: Gould frames his work as a casual conversation over a game of cards. Montaigne's approach is slightly more complicated: in claiming to have written theses pieces only for himself and immediate family, Montaigne completely sidesteps the issue of authorial superiority; one does not assume airs in one's private journal, and what text can be more irresistible to our prying eyes?

For both humanists, the lay public is a worthy audience; Gould is often hailed as "the most widely known and influential expositor of science who has ever written for a lay public" (Lewontin and Levins 199). In Gould's case, however, the term 'popular science' a misnomer:

> In France (and throughout Europe), vulgarisation ranks within the highest traditions of humanism, and also enjoys an ancient pedigree...In America, for reasons that I do not understand (and that are truly perverse), such writing for nonscientists lies immured in deprecation...[this] denigrates the intelligence of millions of Americans eager for intellectual stimulation without patronization...The "perceptive and intelligent" layperson is no myth. (*Brontosaurus* 12)

Gould respects and identifies with his non-academic readers, and wisely so; as Montaigne observes, "We live and have our dealings with the people" (*Essays* 252). Though an unmistakeable member of the French elite, he does possess a more democratic view than many of his compatriots:

> If their [laypeople] conversation wearies us, if we scorn to adapt our selves to humble and common minds, and the humble and common are often well-tempered as the most refined -- and all wisdom is foolish that does not accommodate itself to the common ignorance -- we must give up meddling with our own and other men's business; for both public and private affairs have to be conducted with such people. (252)

Montaigne values a mind "capable of rising and descending" (254) to "various [intellectual] levels" (so as to commune with both neighbors and servants, the "meanest of [his] retinue"). Both writers put themselves on par with readers, fulfilling the humanist's goal of taking "human wisdom down again from the skies, where it was wasting its labour, and restored it to man" (313). For Montaigne, there can ultimately be no salient difference between scholar and layman; after all, "Both kings and philosophers shit, and so do

ladies" (368). Gould, too, is dead-set against intellectual elitism: it is no accident that Gould's highest aspiration for his books is that they grace the tops of toilet tanks around the country (*I Have Landed* 9)--a royal flush indeed.

Communicating with the everyman, however, entails opening oneself up to his criticism. Luckily, neither author considers this a problem. Montaigne relates that, in dealing with friends who "have at times taken it upon themselves to school and lecture me most outspokenly," he receives them "not only in utility but in kindness" (238); he "will love anybody who can strip [him] of [his] feathers" (160). Though Montaigne carries his desire for discussion to somewhat masochistic extremes (he values in his "manly acquaintanceships...love that bites and scratches till the blood comes" [288]), he stresses that the pursuit of knowledge "is not vigorous and free enough if it is not quarrelsome, if it is polite and artificial, if it is afraid of shocks, and is constrained in its ways" (288). More important, however, is the intellectual stimulation contradiction offers:

> Contradictions of opinion, therefore, neither offend nor estrange me; they only arouse and exercise my mind. We run away from correction; we ought to court it and expose ourselves to it, especially when it comes in the shape of discussion, not of a school lesson...When I am opposed, my attention is roused, not my anger. I go out to meet the man who contradicts me and corrects me. The cause of truth ought to be a common cause to us both. (288)

Taking his cue from Socrates, Montaigne views error and discussion as crucial steps in achieving deeper understanding; angering in the face of correction only acts as a block to wisdom. Thus, he must "welcome and embrace the truth in whosoever hands I find it" (288). Montaigne's search for truth is, like modern science, a collaborative, as much as

personal, effort--rendering his work, perhaps, a scientific field trip for humanism. Under Gould's vision of science, the disproving of a theory should be celebrated as a triumph, rather than a defeat:

> The story of a theory's failure often strikes readers as sad and unsatisfying. Since science thrives on self-correction, we who practice this most challenging of human arts do not share such a feeling. We may be unhappy if a favored hypothesis loses or chagrined if theories we propose prove inadequate. But refutation almost always contains positive lessons that overwhelm disappointment, even when (as in this case [referring to a theory regarding the formation of Miranda, Uranus' largest moon]) no new and comprehensive theory has yet filled the void. (*Brontosaurus* 496)

Gould is quick to embrace correction on a personal level as well, because, like Montaigne, he perceives his work as a collaborative effort between author and reader:

> I depend upon readers to solve puzzles that my research failed to illuminate. Time and time again, and unabashedly, I simply ask consumers for help -- and my reward has always arrived, literally posthaste...I have also received unsolicited information of such personal or intellectual meaning to me that tears became the only appropriate response (*I Have Landed* 10).

Gould relies upon his readers for stimulation and guidance in much the same way Montaigne relies upon his friends, proving that the pursuit of knowledge -- including scientific truth -- can be a comprehensive social effort, irrespective of academic rank. Though collective review and criticism is a fundamental tenet of scientific and academic progress, rarely does a member of the 'ancient and universal company of scholars' possess the humanistic persuasion to the extent that he feels inclined to express to his readers that he "love[s] and admires [them] all", ushering them, CV unseen, into the universalist fold of the fabled "Republic of Letters" (10). One example of Gould's democratic intellectual

generosity stands out in particular. In *Bully for Brontosaurus*, Gould writes that he once had the good fortune of receiving a phone call from former US President Jimmy Carter, who summarily presented him with several creationist 'proofs' for supernatural intervention in the history of life on earth (321). Even though the former President's 'scientific' opinion is patently ridiculous, Gould respects his wisdom (and his humanism), enough to republish the letter in his own work, and to point out the flaws in Carter's logic with respectful decorum.

The flipside of this humanistic coin is, of course, respect for one's vanquished foe. According to popular perceptions of scientific 'progress,' "the history of science contains little more than anecdotal interest--for it can only chronicle past errors and credit the bricklayers for discerning glimpses of final truth" (*Darwin* 201). Under this model, "the world of past scientists is divided into good guys who were right and bad guys who were wrong" (201). It's certainly easy enough to lampoon Lamarck, say, or creationism, as students often do in our introductory biology courses. For Gould the historian, however, such an approach is inapt:

> Science is not a heartless pursuit of objective information. It is a creative human activity, its geniuses acting more as artists than as information processors. Changes in theory are not simply the derivative results of new discoveries but the work of creative imagination influenced by contemporary social and political forces. (201)

In other words, science cannot, and does not, isolate itself from the cultural milieu, and Gould takes it upon himself to redeem (at least in part) some of "the most notorious textbook baddies" (203). At the end of the day, "Those who undertake matters that depend

only on the human capacities for guidance, are to be excused if they merely do their best" (Montaigne, *Essays* 112). Humans are, well, human, after all. (As we shall see, however, this does not entail giving ridiculous religious theories a free pass into the annals of truth.)

One notes Gould's forging of "meaningful joinings between the facts, methods, and concerns of science and the humanistic disciplines" (*I Have Landed* 5) throughout his text; after all, he chooses to characterize science as "the most difficult of arts" (Brontosaurus 496) and as a primarily creative, artistic process. But his humanistic naturalism probes further than one would expect, raising an issue of paramount importance in humanism: the search for meaning in a non-adaptive ('perfect') universe. He addresses the apparently humanistic appeals of adaptationism and creationism...

> The second...more important reason for Lamarckism's [a lingering school of non-Darwinian adaptationist thought] continuing appeal, lies in its offer of some comfort against a universe devoid of intrinsic meaning for our lives. It reinforces two of our deepest prejudices--our belief that effort should be rewarded and our hope for an inherently purposeful and pro gressive world. Its appeal for Koestler and other humanists lies more with this solace than any technical argument about heredity. (*Panda's Thumb* 83)

...but suggests that evolutionary theory and the search for intrinsic meaning in human life are not mutually exclusive, using an example taken from the annals of humanism. "Darwinism," Gould argues, "compels us to seek meaning elsewhere--and isn't this what art, music, literature, ethical theory, personal struggle, and Koestlerian humanism are all about? Why make demands of nature and try to restrict her ways when the answers (even if they are personal and not absolute) lie within ourselves?" (83). Conversely, though

Montaigne identifies himself as a staunch Catholic, he never engages theology directly, preferring to seek meaning in nature, rather than culture. If we want to seek reason, we need only "look for it in animals," as it is "subject neither to partiality nor to corruption nor to differences of opinion" (*Essays* 327). The "instructions by which learning seeks to strengthen our courage" (326) are to be found only in "her who once guided us so happily and safely" (327)--Montaigne is as much naturalistic humanist as Gould is humanistic naturalist: both are, essentially, human scientists.

So what does Gould know? In a word, well, a lot (okay, that's two). In emulating Montaigne, Gould operates in the highest traditions of humanism, writing for scientist and non-scientist alike, all the while seeking to align the humanistic and scientific disciplines. He certainly proves his intellectual mettle, covering vast territory on the sliding scale of his lateral thinking. He refuses to characterize his scholarship as being elitist, or even academic, in nature, favoring instead a unified treatment of human knowledge and endeavor. His is a prose devoid of intellectual vs. popular polarity: whatever our disciplinary bent, Gould is sure to challenge our preconceived notions with his wisdom, wit, and honest enthusiasm for learning, pushing all of us to internalize Montaigne's eternal question and employ it as a means of illumination. In effect, then, Gould is the new Montaigne, an iconoclastic genius capable of challenging our everyday biases with casual and unassuming--yet blindingly innovative--enlightenment. Ultimately, however, Gould is out to prove more than his intelligence; he's out to take us on one hell of an entertaining field trip. But then, after all, *Que sais je*?

So Gould values 1) approachability, 2) transparency, 3) diversity, and --most importantly-- 4) 'vulgarization.' As we shall see, however, Wilson's opinion on the subject was vastly different; this heavily affected their views on academic conscilience.

CHAPTER 4

STOP COCKBLOCKING ME: GOULD, WILSON, AND THE FOXY REDHEAD AT THE END OF THE BAR

"--The bartender never gets killed.
--No, man: bartender got it worse than anybody."
-*Desperado*

EO Wilson and Stephen Jay Gould walk into a bar (or so the old joke goes, but, for the purposes of this parable, they are not knocked out). They each take a stool and order a drink. Let's say they're drinking bourbon, southern-style. Wilson's treat. They swap war stories: lectures gone hilariously awry, ridiculous academic policies, irate editors breathing down their necks. Everything seems to be going fine...until one of them smells a woman. They both look up, and there, at the far end of the bar, is an attractive redhead, nonchalantly scoping out the pair of them over her cosmopolitan. She gives it a stir and them a wink. They pick up their drinks and head over. This is when the trouble starts.

"Hey baby," says Wilson, sliding up to her, ruthlessly cutting off Gould, "wanna hang out with a real scientist?" Gould rolls his eyes, shuffling around behind her and seating himself to her left.

"I dunno," she drawls demurely, "I'm a humanist. I'm not sure what you folks are all about. But I'm curious." Gould immediately claps a hand over his eyes; he knows what's coming. Predictably, Wilson launches into a long-winded description of the em

pirical spirit of science and how, in true Baconian fashion, it allows us to demolish the false idols and phantasms of the intellect.

"Once we eliminate these overly elaborate falsities and embrace pure scientific reasoning, what a fabulous place the world's universities will be!" crows Wilson, slugging down the rest of his drink and slamming the glass down on the bar.

"But my friends and I make a living studying those 'phantasms' and the effect they have on history, literatures, psychology, politics, etc," says the humanist, clearly a bit alarmed.

"Sorry honey," says Wilson, "all of those things can be efficiently explained by sociobiology. But heck, the world still needs test-tube washers--I'll even give you a job in my lab. So how 'bout you come on over here and give me some sugar?"

The redhead, horrified by Wilson's patriarchal appraisal, throws her drink in his face and storms out of the bar, swearing off all future scientists, for good or ill. Gould sighs--this is not the first time this has happened.

The story is, of course, patently ridiculous: it is a humanist's worst nightmare (for several reasons). But if you substitute Wilson for the popular criticism of his book *Consilience: The Unity of Knowledge* (1998), Gould for that of his rejoinder, *The Hedgehog, The Fox, and the Magister's Pox* (2002), and the redhead for their humanist readers, you begin to get a clear picture of what (and who) is at stake in the field of 'consilient' popu

lar science publishing. Because although both authors purport to be dealing in reconciliation between Snow's infamous "Two Cultures," Gould and Wilson address their readers very differently, and, true to the major conceits of reader-response theory, these diverse treatments have a considerable bearing on their overall readerly reception. In *Consilience: The Unity of Knowledge* (1998) Wilson utilizes a methodical, paradigmatic approach to frame himself as an erudite instructor, resulting in an alienating (for humanists and laymen alike) atmosphere of cold, clinical condescension. *The Hedgehog, the Fox, and the Magister's Pox: Mending the Gap Between Science and the Humanities* (2003)--Gould's definitive answer to Wilson's bitter (but highly medicinal) pill--adopts instead a generally Galilean strategy, assuming an embracing, jocular tone, thereby allowing the author to cast himself as a friendly, well-meaning, and open-minded peer. This is particularly important, given the unenviable task he feels compelled to undertake: persuading the redhead to walk back into the bar.

Seeing as Gould and Wilson are two primary titans of this chapter, I think it appropriate to take a brief dog-leg and explore the topic of their published "disagreements." First, both Gould and Wilson each held distinguished professorships at the same time, at the same school, and in the same building: Gould occupied the Harvard Alexander Agassiz chair in zoology from 1982 until his untimely death in 2002, while Wilson has held a distinguished professorship there since 1955, and is now the Pellegrino University Research Professor in Entomology. In fact, Gould professed great respect for his 'rival' in his own work: the latter half of the footnote mentioned above However, inasmuch as I

can humbly and nosily determine, this comfort may have been one-sided: according to Steven Rose in his introduction to *The Richness of Life:The Essential Stephen Jay Gould*, Wilson's proximity to his 'nemesis' "made Wilson distinctly uncomfortable about entering the elevator"; accordingly, he was dubbed "The Corpse in the Elevator" by Richard Lewontin (4)! But the trouble with grudge matches, as we've seen, is that they are often described in oversimplified terms that often exaggerate a fairly good professional relationship. (And at any rate, I wasn't there.) What I have done, however, is to make a careful study of the written evidence, which is, nevertheless, the best indicator of the true zeitgeist of their overall disagreement, and this, not surprisingly, affords us the clearest picture of their views regarding the interactions between the sciences and humanities.

Interestingly, *The Hedgehog* was not the only piece apparently tailored as a response to Wilson. Wilson's *The Creation* (1998), which proposes that a synergy between biologists and religious leaders willing to set aside their philosophical differences should result in heightened ecological awareness and conservation, was followed closely by Gould's *Rocks of Ages: Science and Religion in the Fullness of Life* (1999), which denied any relevant conflict between institutions. Wilson's much-lauded *Sociobiology: The New Synthesis* (1975) was notoriously critiqued by humanists as celebrating social hierarchies and power structures as consummately Darwinian institutions (and that might makes right). Interestingly, only pages 547- 574 of the book actually deal in human behaviors. And, in reading the famous 'dirty thirty' (admittedly after Wilson had a chance to revise it), I was struck by how little there really is to balk about (although the characterization of

a menstruating woman having a "'disappointed womb'" [548] is pretty gross). Of course, in characterizing sociobiology as a "macroscopic view" in which "the humanities and so cial sciences shrink to specialized branches of biology," divvying up "history, biography and fiction [as] the research protocols of human ethology" and "anthropology and sociology [as] constitut[ing] the sociobiology of a single primate species" (547), Wilson was lightly flirting with asking for it, especially in his reductive shrinkage and arbitrary dichotomizing of academic fields. At the same time, however, he was claiming that the human sciences were characteristically scientific. And nowhere did I find glaring evidence of a Manichean political worldview, though there were one or two disputable movements; for example, Wilson's stated goal of "searching for the human biogram" (548) implies the belief that man can be fully categorized in accordance with natural laws, a statement with which Gould took much issue. He makes a fascinating comparison between ant 'personalities' (some work harder than others in their own caste group or 'prefer' certain activities over others) and human workers, but takes it a bit far in a eurocentric direction when he claims "The slave society of Jamaica...was unquestionably pathological by the moral canons of civilized life" (549). He qualifies the statement, of course, as being derived from a western moral code; however, the use of that paradigm muddies the waters of a clear comparison between primates and non-primates: what exactly is he trying to prove? He declares that the Ik of Uganda, who were recently forced to shift from a hunting-based to an agricultural lifestyle, represent a wide deviation from the norm in human behavior and value systems. But again, the effect is murky: how are

we to interpret them as being culturally unique if they have lost most of their culture? And his usage of these non-white examples does seem suspect, especially in light of the fact that, in the subsequent paragraph, he explains that much of this behavior can be attributed to genetics (550). Indeed, he seems to be interpreting these results as evidence that even wildly 'inefficient' or 'doomed' social systems will continue to function in man, but not for any other non-primates, for he alone "has temporarily escaped the constraint of interspecific competition" (550). But this represents a bit of a problem from both an anthropological and evolutionary perspective: if modern humans are fundamentally primates, and primates are fundamentally mammals, with a discernible 'biogram' representative of a fundamentally biological culture composed of new cultural innovation and phylogenetic vestige, how then can we claim to have evaded our animality, even if we are only one species? What about the very real effects of intraspecific competition? How can he endorse the principle of a genetic basis for upward social mobility but claim that we are somewhat stable as a species? What about culture and its inherent contingencies? Wilson could argue that it, too, constitutes part of the biogram, but even so, how can a destructive culture evolve if humans are playing by purely biological rules? Either way, the examples being used are not particularly good reference points for an argument, since both represent such small time scales. On the other hand, is he claiming that because black Jamaican and Ik culture represent recent radical transplants and forced culture-stripping, they provide us with a model of culture as an adaptive process, without which we are effectively screwed? If that's so, it would seem to explain his stance on homo

sexuality and xenophobia as being biologically adaptive methods of group preservation (the non-reproductive male homosexual helps parents or siblings raise their young, up ping group fitness, while the xenophobe prevents other cultures from depleting the group's common resources). Personally, I agree with the latter (just look at non-human territoriality, which represents a clear struggle for resources, without which mass starvation occurs [a quicker version of this occurs when predators are removed from ecosystems and ungulates over-consume the flora]), but feel pressed to throw a Gouldian "Spandrel" qualm into the works of the former. After all, homosexuality has not been shown to be adaptive in other animal models. A buck goat that occasionally mounts other bucks does not help his sibling does raise their kids, and though there exists the possibility he is aiding in herd defense, it is debatable whether there exists any difference between a defensive homosexual ram and a defensive heterosexual one. And anyway the whole question is convoluted by the fact that, in many mammal species (including goats), dominant males will mount subordinate males as a display of their power differential. So what are we counting as homosexual, here? Mounting? Anal penetration? Prolonged anal penetration? Ejaculation? Does that last one even occur between males in non-human animals? It would surely seem to be a non-adaptive 'random accident' behavior if it did, since that sperm isn't going to inseminate any does and result in offspring carrying the buck's genetics. And what about homosexual human couples who adopt? They are raising a child, yes, but it doesn't carry their genetics. Anyway, you can see where things start to get sticky here, and fast. Clearly, physical science alone cannot fully explain the human

condition. And that is why, for many scientists (both human and physical), even the hint that human sociology might have a genetic basis is enough to engender a quick response.

Wilson's text, for example, was almost immediately shored up by Gould's fervently Anti-Social Darwinist tract *Biology as a Social Weapon* (1977, with other outraged members of the Science for the People movement), followed, of course, by his book on the same subject, *The Mismeasure of Man* (1981), which systematically dismantled the common misconception that science proves, endorses, or condones the "always present, always available, always published, always exploitable" (28) bugbear of Social Darwinism (1994's *The Bell Curve* contributed to triggering a Revised and Expanded Edition in 1996, blatantly subtitled *The definitive refutation to the argument of* The Bell Curve). Because for Gould, sociobiology and modern eugenics represent frightening tendencies in human reductionistic thought: they are "invalid not because biology is irrelevant and human behavior only reflects a disembodied culture, but because human biology suggests a different and less constraining role for genetics in the analysis of human nature" (356). Scientists seeking, "for example, to identify an adaptive and genetic foundation for agresssion, spite, xenophobia [oh, well], conformity, homosexuality, and perhaps upward mobility as well" (357) have "made a fundamental mistake in categories. They are seeking the genetic basis of human behavior at the wrong level. They are searching among the specific products of generating rules--Joe's homosexuality, Martha's fear of strangers--while the rules themselves are the genetic deep structures of human behavior" (359). On this issue, Gould refuses to accept "a golden midpoint": he sees the range of behavior as

being too broad to "atomize," as he believes sociobiologists do, "into distinct traits coded by separate genes...specific behaviors are epiphenomena of their rules, not objects of Darwinian attention in themselves" (359). Gould may here seem to be speaking from a 'subjective,' non-scientific liberal platform; it is important to understand, however, that Gould actually saw his logic as profoundly scientific, and not occluded by notions of human dignity: most biologists (including myself) approved his explanation of human phenomena (such as homosexuality) as being by-products of the mind-bogglingly complex processes of contingency and natural selection that gave rise to modern mammals. As Gould famously pointed out in "The Spandrels of San Marco," it is a mistake to assume that all of a species' observed characteristics are adaptive (i.e. have been optimized for survival and, thus, reproduction), because 1) natural selection does not act on all of an individual's characteristics, 2) there is more than one way to optimize your reproductive fitness (like bees helping their sisters, who carry 75% of their genes due to a haplodiploid fertilization system) and 3) there is more than a little chance and unpredictability inherent in the game of life. In other words, some traits are genetic 'piggybackers;' or learned behaviors based on personal experience; they simply are, and one doesn't need to ascribe to them a causation. Both physical and human scientists (like Matthew Arnold), in seeking to explain much of the phenomena surrounding them, don't expect a definitive unilateral theory of everything. In other words, Gould wasn't 'pandering' or 'currying favor with humanists' (though he was passionate about art and literature): by avoiding the common human temptation to explain everything with one master stroke, he was a scientist engag

ing in science, not a politician engaging in politics. Again, though several authors, including David F. Pringle (*Stephen Jay Gould and the Politics of Evolution* [2009]) have deftly explored the mistakenly-perceived 'leftist' leanings of Gould's personal views (as well as the dangers of such polarized perception), Gould himself would have seen his motivations as soundly scientific, rather than political or ideological. Ditto for Wilson. (Nor did he give religion a free pass: where theologians violated NOMA in matters of Universal origin, Earth's geological age, the origin of man, or man's place in nature, he was determined to disprove them--more on this later.)

Wilson, meanwhile, in the 25th Anniversary Edition of his *Sociobiology: The New Synthesis* (2000) countered that Gould was among "the last of the Marxist intellectuals" (vi) and that his own work had been seriously misjudged and negatively hyped as being viciously determinoreductionistic: he was quick to point out, however, that his "sociobiological explanations were strictly reductionist, but interactionist. No serious scholar would think that human behavior is controlled the way animal instinct is, without the intervention of culture" (vi), thereby bringing himself more in line with Gould's perspective than is commonly thought. The thing is, though, he still believes culture to be rigidly controlled by genes. He also takes a shot at the rhetorical stylings of his detractors (particularly Gould, who was particularly adept at such tactics), claiming that the "suggest[ion] that I held such views, and it was suggested frequently, was to erect a straw man--to fabricate false testimony for rhetorical purposes" (vi). Taken together, this epic, decades-long Clash-of-the-Publications points to one important conclusion: Gould abso

lutely refused to allow Wilson to claim sole ambassadorship to the humanities. Whether intentional or not, Gould effectively prevented Wilson--as a reductionist-- and Dawkins--as a fierce determinist--from claiming biological sovereignty over writing on the subjects of science and the humanities, thus preventing them from becoming the sole voice to which curious non-biologists would turn in search of 'consilience.' And this, in turn, had some important consequences.

Many scholars have commented on Wilson's spectacular, though well intentioned, failure. Leah Cecarelli's comprehensive study of Wilson's "most consilient work" (*Shaping Science with Rhetoric* [2001]), demonstrates that "Wilson was wrong to take the particular approach to unification that he did, not because interdisciplinarity is a flawed idea but because his particular approach to unification was designed in a way that angered scholars who otherwise would have been open to his call for action" (127). What ticked them off? Well, according to Ceccarelli, primarily his "rhetoric of conquest, rather than the rhetoric of negotiation" (128) used by his colleagues in the physical and biological sciences. In fact, Ceccarelli is particularly keen on documenting the multiple instances of caucasian domination metaphors, including prospectors moving westward into unoccupied territory, Megellanic explorers, and even a bold Cortez, looking down with "expansionist" (137) disgust upon "the backward native on whose land he treads" (131). Similarly, his continual and dogged biological reductionism, which he sees as being the only necessary tool in a thinker's box, understandably rubbed scholars on both sides of Snow's 'great divide' the wrong way, even bordering on what many humanists would point to as

a backward claim of western superiority; he points out, for example, that Chinese scholars never achieved "what may seem today the obvious best way to have constructed knowledge of the physical world" (*Consilience* 30). For a humanist, this is a taboo statement, arguable factuality nonwithstanding: modern human scientists are (rightly) trained to bark at such colonial statements. And, in fact, it is far from a wise scientific move, given that traditional Chinese medicine is increasingly being validated by modern medical science (acupuncture, meditation, etc). This attitude got him into trouble in several other places: this is not Wilson's first tangle with the charge of racism, leveled by poorly informed and overly political humanists: Gould relates the story in *The Hedgehog*:

> At a meeting of the American Association for the Advancement of Science...a group of juvenilistic idealogues...arguing that sociobiology spread racism (a nonsensical charge since the theory deals with putative universals, and not with causes of geographically based variation, the pseudoscientific basis for racism), rushed the stage, and "demonstrated" with chants and charges. One student, yelling "Racist Wilson, you're all wet," took a cup of water and poured it over Wilson's head. (204)

Gould, in a touching show of magnanimity, stands up for his embattled colleague, expressing his wish that he'd acted quickly enough to knock the glass out of the assailant's hand. Because, for Gould, it wasn't personal, though doubtless it became so for his colleague. Gould didn't give a hoot about addressing any charges leveled by 'extremists' because, though negative, his was an entirely scientific critique of Wilson's work, never straying into rhetorical derivation.

And, truth be told, not all of Wilson's language was so harsh: he does offer "a few cautious suggestions and qualifications" (Ceccarelli 147). He does make a point of stat

ing, for example, that "science is not trying to melt the Inca gold," thereby mitigating his positivoreductionistic stand. Ultimately, however, it made no difference to the reviewers: "because they had no reason to dismiss his more hostile words...they decided he was equivocating, and they decided to reject his more moderate statements as clumsy political moves that did not represent his true beliefs" (148). And Wilson replied to these statements will ill-considered rebuttals, most of which equated any negative response with disciplinary vigilantism and selfish, reactionary politics, when he might have reassured and assuaged.

Sociobiology (1977) and *Sociobiology: The New Synthesis* (2000) notwithstanding, *Consilience* would have made an excellent textbook: the work contains quite a few bulleted items. For example, there is a concise but comprehensive list discussing the various functions of the tripartite brain (172). The same page features a list of unanswered questions haunting molecular and cellular biologists of the late 20th century. On page one-hundred-seventy-two, a list of psychoanatomical responses (you get the idea). Only rarely does Wilson cite any novel cases or factoids, relying instead upon well-worn exempla to prove his theses; anyone who has ever taken a biology class knows about sickle cell anemia and partial genetic dominance, the anatomy of the brain, and D. melanogaster. Like authors of other popular consilient texts (Schrodinger or Dobzhansky, for example [Ceccarelli 160]), Wilson is assuming the role of a teacher; he's educating his

readers, who, due to his lack of footnotes, can only assume "that Wilson was rigorous and current in his use of information from many different disciplines" (165) and are likewise thrust into the position of intellectually dominated pupil.

And he does a great job of looking down on them; anyone who reads *Consilience* for more than an hour is bound to start feeling like a complete idiot, not, mind you, for his choice of text, but for his reaction to the authorial monolith scowling down at him. (Because the book is clearly important: if you hold the imposing black and white volume face up and move it slowly up toward your eyeline, you will hear the opening strains of Strauss' "Also Sprach Zarathustra" playing softly in the background.) And unlike either Schrodinger or Dobzhansky, who employ polysemy to appeal to different groups at once (Ceccarelli 164) Wilson's prose is brutally straightforward: his "statements were too blatant, extreme, and biased to be interpreted as friendly to both sides of the battle" (166). Let me put that another way: humanists believe that Wilson thinks his non-scientist readers are a bit thick. For them, when he tells his readers that "my subject is hypercomplex" (88), whether professional or layman, he is really telling them "I know this, you don't, so you should take my word for it". After all:

> Most people believe they know how they themselves think, how others think too, and even how institutions evolve. But they are wrong. Their understanding is based on folk psychology, the grasp of human nature by common sense--defined (by Einstein) as everything learned to the age of eighteen--shot through with misconceptions, and only slightly advanced over ideas employed by the Greek philosophers. (199)

Now for the overly-sensitive humanist's translation: "You there! Superstitious troglodytes practicing your pagan midwifery! Stop dribbling on your blue collar shirts and listen to

me while there's still time. Otherwise you're screwed. I mean it--I can cite Einstein!" It's a pretty good strategy, indoctrinating people through exploiting their fear of ignorance (not to mention beating them over the head with their mental Baconian idols): no one wants to feel like an idiot around one of the top scientific minds of the last century. Even more interesting is his non-regard of academic humanists; nowhere does he directly address them. At least, one hopes he isn't directly addressing them, not when their "Advanced social theorists, including those who spin out sophisticated mathematical models, are [like the layman] equally happy with folk psychology" (200). And heaven forbid the reader belong to that undesirable subclass, the social scientists (never mind that this field represents the only real competition to Wilsonian sociobiology); theirs is a field "easily shackled by tribal loyalty...still in thrall to the original grand masters" (199). For they exist only in the distracted "byways of critical theory, functionalism, historicism, antihistoricism, structuralism, poststructuralism, and -- if the mind is not steeled to resist--thence into the pits of Marxism [the horror] and psychoanalytic theory [the horror] where so much of academia disappeared in the twentieth century" (199). I think I speak for the majority of academic humanists when I say: them's fightin' words. Certainly Wilson has rhetorically neutered academics in order to advance sociobiology in the hearts and minds of his captive audience. But to assume he would stop there would be tantamount to fatal underestimation: for his next trick, Wilson actually praises the social sciences for their complexity--it's just that no one (especially not a humanist) has ever managed to get an accurate handle on them. As a result, all their "textbooks are a scandal of banality" (199),

even though their areas of expertise "should be called the hard sciences" (199). They are "intellectually capable," even when "it is obvious to even casual inspection that the efforts of social scientists are snarled by disunity and a failure of vision" (198). Here, I have to admit, Wilson is genius in influencing readerly opinion of academics, remitting slightly on his polemic to make his argument more palatable: his effective argument is that humanists aren't ultimately at fault for being subjectively misguided--they just didn't have the right direction in pursuing their research within the tenets of sociobiology (a direction that Wilson, quite conveniently, happens to hold the market on). This perspective is emphasized by a rather Platonic dialogue between a sociologist, an anthropologist, a primatologist, and a sociobiologist. Wilson's rhetorical structure here is especially clever. First, the sociologist speaks first, offering a somewhat dim and superficial definition of his field. The anthropologist responds with interests of broader scope. He, in turn, is answered by the primatologist, who declares that "your conceptions need to put in an even broader perspective" (208). All are answered by the sociobiologist, who insists that through his field, biology and sociology are unified. *Scientia vincit omnia*; Wilson's intellectual progeny has found its way to the head of the truth buffet, leaving no room for competition from the humanities.

No wonder the redhead wants to cut and run; any humanist worth their salt would immediately perceive the book as announcing a clear and present danger to the future of their magisteria. Clearly, Gould has his work cut out for him. After all, scientists have to coexist and commingle with humanists on a daily basis: no one wants a university range

war. Mutual tolerance is necessary before any serious intellectual progress can be made, especially today, when environmental and economic crises threaten so much of the world's population: the proximate causes to human and animal suffering debated so vigorously by Wilson are, in the end, not the most pressing issues, whatever your definition of truth; only the solutions matter. No one understands this better than Gould, who is keenly aware that "Vulpine flexibility may be the greater virtue in such a diverse and dangerous world" (*An Urchin in the Storm* 12). Such an observation must, of course, be tempered by "a general plea for rationalism" (14), as pure relativism can lead only to "dangerous weapons of destruction" (15). But if one employs both the vulpine and the erinaceinaeic, yoking the best of both worlds "awards the benefits of both the fox's and the hedgehog's world: the virtues of consistency in a view of life, with the wonderfully diverse products--the veritable storm of results--that an unpredictable contingency places upon our earth" (15). Thus, "We can revel in all the pretty pebbles for their own sake, while maintaining a coherent view of their estate" (15). The storm, it should be mentioned, can also bear negative connotations, including academic civil war; unfortunately for Gould, only by getting the redhead back into the bar for civil conversation and a hearty round of "valuing diversity in all its guises" (16) can it be avoided.

But still, the question remains: how to coax her back in?

One answer: by using turf and terms non-biologists can appreciate. Stillman Drake points out in *Discoveries and Opinions of Gaileo* that the eponymous astronomer and physicist "published for the benefit of his countrymen in every walk of life who hap

pened to share his insatiable curiosity about the universe and his ardent wish to discover the laws of nature" (2); by 'enlivening' and 'popularizing' with his sarcasm-laden Italian, he was addressing the layman, rather than the academic or professional scientist. Drake contends that the majority of his intended audience "were delighted by his barbed attacks against pedantry as well as by the colloquial fashion in which he presented his own discoveries and opinions" (2). Such a strategy appears to be at work in *The Hedgehog* as well: much as Galileo ridicules religious control of contemporary scientific practice, so Gould wields his witty, somewhat acerbic prose like a pair of whimsical hedgeclippers, flashily snipping away at those conventions of scientific discourse he deems to have outgrown their proper magisterial constraints. Indeed, he presents *The Hedgehog* as a Galilean dialogue for which he must "Introduce the Protagonists"; instead of Salviati, Sagredo, and Simplicio, we have 16th century zoologist Konrad Gesner's illustrations of the cunning, multifarious Fox and--his infamous adversary of Erasmusian lore--the blunt, persistent Hedgehog, coupled with the handwriting of Magister Lelio Medice, who doggedly censored Gould's own copy of Gesner's Historia animalium (1551). These inked impressions are not perfect, one-to-one mirrors of Galileo's characters--though one certainly might sense some validity in the pairing of Gould's humanist fox/Sagredo the intel ligent non-scientist, the determined hedgehog/Salviati the scientist academic, and the ignorant Magister/Simplicio the fool--but they do suggest a philosophical unity between Gould and his iconoclastic predecessor, in that both perceive their arguments and the larger sphere they occupy (religious dogma/humanities 'vs.' science) to be somewhat re

ducible to the level of oppositional allegory. Gould, of course, recognizes the danger inherent in total rhetorical reductionism--he claims in the introduction that the essays to follow will "not be based on the most straightforward or simpleminded comparison" and that " I emphatically do not claim that one of the great ways (either science or the humanities) works like the fox, and the other like the hedgehog" (3), but advocates that they be perfectly imperfect metaphors for the sort of paradoxically chaste interspecies 'mating' necessary to bridge the titular 'gap' between the academies. It should be noted, however, that in negating these claims Gould realizes that his usage and endorsement of these rhetorical figures may cast his argument as somewhat combative, and perhaps paradoxical as well--especially to a paranoid humanist now accustomed to keeping her hackles up in the presence of scientists. More importantly, however, such allegory is ultimately employed as a means of entertaining instruction; its purpose is to clarify and educate by providing a clear metaphor for Gould's model of Non-Overlapping Magisteria (NOMA). But to whom, exactly, is he addressing himself? Like most writers of popular science, the majority of Gould's works were received by the mass market, by what many scholars (of all stripes) refer to, somewhat degradingly, as 'laymen'. *The Hedgehog*, however, appears to be a horse of a different color, directed specifically at a somewhat more rare (though hardly rarefied) breed: those connoisseurs of interdisciplinarity interested in the perhaps overhyped conflict between the sciences and humanities (it is, after not, not billed as a book on Cambrian Shales or baseball, but on a very specific and somewhat esoteric subject). At the same time, readers in the sciences are invited to take part in the

conversation (whether they actually engaged themselves might be another story). In this case, Gould has boldly undertaken (delightfully literally, in this case) the Aesopian form, a "rhetorical strategy [used famously by Dobzhansky] in which one meaning is inserted for a dominant audience and another, hidden meaning is inserted for a subordinate audience," effectively balancing "outward support of the more prestigious science...with a subtle turn that support[s] the less prestigious" (Ceccarelli 54). Unlike Dobzhansky, Gould has undertaken the considerably more arduous task of reconciling the sciences with the humanities, rather than science with a fellow science. As Ceccarelli points out, however, such an attempt can be fraught with rhetorical landmines: "an Aesopian message does not always allay the professional worries of members of the weaker, more defensive group" (55), leaving the author at risk of being taken as two-faced, one who speaks from both sides of his mouth.

In particular, Gould is most keen to court the humanist, who recently may have read and been (understandably) horrified by Wilson's earlier, supposedly consilient, safari into 'darkest humanism.' The evidence for this comes in two forms: 1) Gould's occasional slippage into discourse about a "suspicious public" (115)--if, in his mind, he were addressing 'laymen', he likely would have opted for a different approach--and 2) his direct 'calling out' of any sneaky incognito humanist readers lurking in the corners:

> Given my commitment to reciprocal enlightenment between science and humanities, and not wanting so thoroughly to castigate my own colleagues or my own revered profession, let me close this diatribe by pointing out, lest my humanistic readers become smug, that we scientists have also fig ured out a foxlike thing or two about communication, and that you would

> do well to heed the rustics and naifs operating by the seat of their pants within the world of science. We may generally write poorly, and by the rules of our own construction that make no sense under any ideal of sty listic felicity. But we generally talk ever so much better than you do--and for a pair of reasons related in reverse to our failures in writing: because, in this sphere, unlike our writing, we have not set rules for false purposes, whereas you have done so, and have therefore failed by disre garding a natural inclination toward proper communication. (134; my em phasis)

Unlike Wilson's conspiratorial, back-room tactics, marshaling support for science by denigrating all competing knowledge systems to an audience composed, to his mind, exclusively of 'laymen', Gould chooses to include his would-be adversaries in an open forum. He self-consciously recognizes that he is "pursuing [a] rant," and extolling his many "pet peeve[s] about...scholars in the humanities" (135). The prose is certainly acerbic; but the academic reader is considerably comforted by being made aware that Gould's complaints are made "somewhat facetiously." Nor is this criticism one-sided: Gould is quick to point out the flaws in the communications of his own club, as well:

> Because we have cut ourselves off from scholars in the humanities who pay closer attention to modes of communication, we have spun our self-referential wheels and developed artificial standards and rules of writing that virtually guarantee the unreadability of scientific articles outside the clubhouse. (132)

For Gould, this form of insular, codified communication is both 'clique'-ish and futile, an almost infantile gesture designed to throw baying humanists off the scent. Scientists are cast as cultural infidels, their "denial of importance to modes of communication... [having] engendered a more than merely mild form philistinism" (132). Gould seems more than willing to admit to the "moral and political failures" of his profession, even to

their apparent lack of articulation, writing, as scientists do, "in the most infelicitous of all English modes: the unrelenting passive voice" (132). Nor does he insist upon the supremacy of scientific endeavor, criticizing the "triumphalist conviction of most scientists [**cough* Wilson*]" because their "Whiggish assertions alienate colleagues in other fields by claiming a special privilege for science" (115)--while Wilson presents himself as a conquering Alexander, boldly severing the Gordian knot, Gould chooses to appear in The Hedgehog as the critical onlooker, the horrified surveyor of the aftermath of the major battles in the so-called "science wars", who "watched in sheer frustration (and too much silence, for I should have spoken out far more than I did) as the two perceived sides formed their supposed battle lines" (96). For though "no garments of veracity covered this particular invention [the war]" (97), the aftereffects were all too real: even Gould still persistently identifies scientists as philistines, and humanities scholars as equally brutal "guardians of the language" (130); for all his show of neutrality, Gould still subscribes to martial imagery in reference to the 'two cultures' (I myself have engaged in animalistic, warlike, and even gendered terminology, for which I will surely be attacked). Even more interestingly, though, the players are cast as distinctly American, with at least a dose of pop history: not only does he use the civil war as a metaphor for an academy that, once reunified, might "keep [its] diverse themes together...[and] could include a full range of human and natural differences" (155), he uses MLK Jr.'s "I Have a Dream" and "Casey at the Bat" to demonstrate the difference between written and spoken English, and thus, scientific and humanist prose. This creates an atmosphere of general approachability to the

topic; where Wilson insists upon an atmosphere of data, Gould prefers a forum of popular culture--talking to humanists rather than at them. And (here, at least) the public's been accorded some free will--well, the power to doubt, anyway, making it the scientific author's job not to preach (as in the Wilsonian mien), but to engage in "important melioration of the fears and misapprehensions of a suspicious public...or showing the skeptics, in other words, that hedgehogs really can be useful and cooperative, despite their overt prickles" (115). And where Wilson runs roughshod over the layman's 'ignorance', bru tally proselytizing in hopes of gaining followers to his 'better way,' Gould prefers a gentler means of persuasion.

Under the banner of Gouldian consilience, the academies no longer have a failure to communicate: long-fermented issues are safely aired in an atmosphere of parley (even with its irate undertones, this diatribe, purely by directly addressing human scientists with an air of constructive criticism, is more consilient than Wilson's eponymous text ever could be). Having directly addressed the one of the tenets of humanist scholarship (specifically the 'boring' conference presentation, about which Gould is surely right), it is clear Gould expects 'academic humanists' to read his book. And he refuses to let them creep by unnoticed, indicating that his is a message with more than 'lay' application. But why bother addressing humanist academics at all? And why use an overly simplified, Aesopian approach, one which may strike some academic readers as being rather more on the level of elementary, fairy-tale pedagogy (Gould does, after all, begin the book with the clever Russian equivalent of "once upon a time") than serious prescriptive scholar

ship? That sort of Galilean parable may be fine for the layman, the consummate humanist might reflect, but as scholars, we deserve a more fully articulated explanation. To answer that, however, we have to read between the lines a bit, so that we can begin to get at what Gould cannot, for reasons of academic camaraderie, state too loudly: stop cock-blocking me.

As Gould himself states in his introduction, a major portion of his book is dedicated to the attempted reversal of EO Wilson's prickly, rampant poaching of the humanist domain, seeking the true meaning of consilience by "rejecting his [Wilson's] favored path to our common goal" (3); Gould exposes Wilson's incorrect interpretation of William Whewell's original term, focusing particularly on one key caveat, "an explicit restriction placed by Whewell upon his own term consilience [which, for Gould,] happens to embody the central argument for the primary failure of Wilson's program" (203). What follows is a delightful (for the humanist word geek) etymological rending of the word, which most closely translates to a harmonic, yet multivariate "jumping together" of academic fields, rather than the singular, reductionist "sociobiological" interpretation utilized by Wilson as a Platonic, world-building *idee fixe*? Gould explains how reductionism, which constitutes a powerful tool in the sciences, nonetheless cannot apply to the humanities (a premise stated even by the word's originator), for reasons of emergence (most properties of the humanities are nonlinear and non-additive [i.e. they cannot be broken down]) and contingency (no definitive laws govern the processes of humanities; like history, they are subject to random, unique events). In this way, Gould effectively qualifies

Wilson's argument, excuses his spiny, power-tripping colleague, and courts the humanist back to his corner.

By the second half of *Hedgehog*, Gould is larking right along, extolling the virtues of E pluribus. In this post-dialogue world, anything is possible for unified scientific and humanist kind:

> We can break these old bonds of recrimination, and become equal partners in unity, if we practice, simultaneously, both sides of a superficial contra diction with a deeper underlying consonance: that is, if we can enjoy our fusion in intentions, motives, and several aspects of creative practice...(155)

A few choice pronouns, and suddenly everything's hail fellow, well met. Quite right, too: Gould's gentle net is fairly irresistible, even to an aloof human scientist--for even in leveling criticism at the humanities, he is precise and balanced, recognizing the faults and virtues of both parties. In casting himself as the councilor of a somewhat troubled branch of learning, however, Gould reveals (perhaps unintentionally) several of his slightly...*spinier* biases.

Determined human scientists may well bristle at being likened to Andersen's infamous 'Ugly Duckling,' struggling for acceptance among his much more intrepid fellows [the sciences] (200). A truly consilient member of that tribe might assume, at least initially, that Gould's intention is to reify, rather than denigrate: after all, the ungainly beast eventually becomes (after much heartache and a deep depression) an elegant swan. But is this really a compliment? Because, much to the reader's dismay, it doesn't appear that Gould is dealing in future, adult waterfowl, only present, nascent ones. Thus, we

must always remain “at the big and clumsy end” of “a consilient chain, with sleek and well-coordinated little ducklings on one end and awkwardly complex cignets on the other” (200). Because even if, as Gould says, these “Ugly Duckling[s], at the big and clumsy end, may take just as much pride as the most complex configuration” (200), they still get the short end of the Truth stick: yes, they are complicated, and yes, that can be good--but as Gould slyly intones, their top-heavy field is literally too labyrinthine to be viable: if they try to swim with their scientist ‘brothers’, they are going to drown. And even if they might, eventually, attain gorgeous swanhood, they aren’t there yet. Here a humanist may genuinely grimace: no one wants to be stuck in arm floats at the shallow end of the proverbial pool at the behest of an over-concerned guardian. Because if science is the oldest sibling, the humanities must be its annoying younger brother, continually skinning its knee in a constant struggle to keep up. And this is--despite Gould’s good intentions--hardly equal footing (even for a fuzzy, superficial dichotomy).

However, given the crucial differences in their rhetorical strategy, are Gould and Wilson really attacking the same humanistic ‘strawman’? Gould coaxes the humanist reader gently into a plush archway of live-and-let-live, padded with careful constructions of well-calculated brotherly embrasure. Wilson, on the other hand, shoves them headfirst down the cold metal chute of his proselyting abattoir. Both scientists love science: for them, science provides a more meaningful and engaging way of dealing with the world, and scientists don’t goose-step when it comes to the search for Truth; for each, pure ‘humanism’ will always be second best. This really isn’t surprising; a consummate, dyed-in-

the-wool scientist would never claim that their approach to reality could be rivaled. But unlike Wilson, Gould is willing to recognize the importance of the humanities and their valid role in human academic society by walking in the fox's shoes; the ubiquitous pres ence of humanistic writing in his own essays is clear proof that he isn't just paying her empty lip service. As a 'popular science' writer, for him to claim otherwise would be highly hypocritical, given that he regards "this genre of popular writing as an essential part of the humanistic tradition, and not as an exercise in discourteous and ultimately distorting gee-whiz simplification" (140), a tradition that, he notes, includes both Darwin and Galileo. Even his professional journalistic work, directed exclusively at fellow scientists, betrays a distinctly humanist leaning: scholars like Charles Bazerman and Jack Selzer have long focused on Gould and Lewontin's "The Spandrels of San Marco and the Panglossian Paradigm" as a key exemplum of authorial "Intertextual Self-Fashioning" and "disciplinary reorientation" (21). So no: Gould's conception of the humanities is, despite his occasional slippage into inequitable 'philistinism,' both more inclusive and more relevant than Wilson's overtly prickly wrecking-ball, which is exposed not as the rule, but the exception. Nor does Gould's language vary between intended readerships; his tone and terminology remain the same whether he addresses humanists, scientists, or laymen (he makes a point of refusing to use 'laymen's terms' [140]). And so, if the allegorical parable seems peculiar [from a scientific standpoint], it's only because, as a humanistic writer himself, Gould knows that these sorts of false dichotomies, with all their delightful contradictions and paradoxes, are right up the humanist's alley. And, true to

form, we find this heavily reflected in the human sciences, especially in the studies of sociology, philosophy, and rhetoric of science.

CHAPTER 5

THE FORMLESS, MUTE, INFANT, AND TERRIFYING FORM OF MONSTROSITY: THE BIRTH OF PHILOSOPHY, SOCIOLOGY, AND THE RHETORIC OF SCIENCE

> "Elevated, elevated...what does that mean, *elevated*? I am fed to the teeth with all of these elevated things...people so lofty they sound as if they *shit* marble!"--Mozart, *Amadeus*

> "I employ these words, I admit, with a glance toward the operations of childbearing--but also with a glance toward those who, in a society from which I do not exclude myself, turn their eyes away when faced by the as yet unnamable which is proclaiming itself..."--Derrida, "Structure, Sign and Play in the Discourse of the Human Sciences"

In the mid-twentieth century, human scientists sought to publish texts that took a different approach to science, offering close examinations of its philosophy, sociology, and rhetoric. Such analyses were and are immensely helpful for all scholars seeking to better understand the workings of the sciences, largely because they demonstrate the philosophical barriers, disciplinary hurdles, and fundamental decisions facing professional scientists, thereby humanizing what might otherwise be stereotyped by critical outsiders as an impassive, soulless, fundamentally inhuman process. More importantly, their scholarship demonstrates the radical continuities between practitioners of the human and physical sciences.

One of the principal players in this opera is Karl Popper, whose *The Logic of Scientific Discovery* (first edition 1934, first English edition 1958) is still frequently cited in

the work of cultural, philosophical, sociological, and rhetorical critiques of science. Popper is a particularly interesting figure, particularly because he, as a philosopher of sci ence, challenged and illuminated the very core working method of the scientific process: Popper contended that science does not work by the inductive method (from observations and "singular statements" to "universal statements"), but quite often by the deductive method of testing (a logical progression from the universal to the singular). Part of his proof for the comes in his famous example that "no matter how many instances of white swans we may have observed, this does not justify that all swans are white" (27), as we might if inductive logic were our sole means of theory-making. Of course, it must be pointed out that without universal theories (such as the law of gravity or natural selection) as framework and scaffolding, there can be no deduction in the first place, and that so much of science is done in service of testing an already established theory simply in order to test its very universality; this is how we came to know that swans do, in fact, come in several different flavors. But overall, Popper is making a good point: science (as opposed to say, pseudoscience or religion) was honed to the elegant tool it is today by the process of continuous testing. This, then, affords us a less jaded view of the problem of 'objectivity vs. subjectivity:' absolutely nothing is taken on faith, because tenets have to line up with all subjectivities:

> My use of the terms 'objective' and 'subjective' is not unlike Kant's. He uses the word 'objective' to indicate that scientific knowledge should be justifiable, independently of anybody's whim: a justification is 'objective' if in principle it can be tested and understood by anybody... Now I hold

> that scientific theories are never fully justifiable or verifiable, but that they are nevertheless testable. I shall therefore say that the objectivity of scien tific statements lies in the fact that they can be inter-subjectively tested... (44)

In other words, science is almost objective because it can be examined by people of varying convictions, including empirical ones. Of course, all humans are still fallible, so true 'objectivism' cannot really exist. Such a strategy is therefore our best (though still imperfect) means of eliminating personal bias in the interpretation of observable data in service of larger theories. Because they are human-centric activities, after all, there can be no all-encompassing, ultimate, inviolable theories (even gravity has its quantum side). This, then, is what separates science from faith: "inter-subjective testability always implies that from the statements which are to be tested, other testable statements can be deduced...[and therefore] there can be no ultimate statements in science" (such as an a priori-type "God did it") for the very simple reason that "there can be no statements in science which cannot be tested, and therefore none which cannot in principle be refuted, by falsifying [disproving with data, not fudging] some of the conclusions which can be deduced from them" (47). I don't know about you, but I see nothing particularly inflammatory here, nothing that isn't an astute philosophical extension of the teachings of any elementary school biology course.

And, in fact, Popper's gleefully titled autobiography, *All Life is Problem Solving* (1999), contains a philosophy of scientific problem solving intimately allied to my own. In "The Logic and Evolution of Scientific Theory" (originally a radio broadcast, airing the 7th of March, 1972), Popper advances his theory that all learning advances in three

stages: 1) identifying a problem, 2) attempting different solutions, which scientists call trials, and 3) the elimination of false hypotheses. Not only does this solution arise from "fundamentally the same method that common sense employs, the method of trial and error...trying out solutions to our problem and then discarding the false ones as erroneous" (3); "It is also the procedure that a lower organism, even a single-celled amoeba, uses when trying to solve a problem...We might compare the animal's successful solution to an expectation and hence to a hypothesis or a theory" (3), thereby marking it the ubiquitously strategy of all Earth-bound life (although, having been trained in evolutionary biology, I am compelled to point out that there is no such thing as a 'lower' organism; single-celled organisms staggeringly outnumber multicellular forms of life on this planet as the most successful branches of life on Earth). Further, Popper characterizes his theory as a being fundamentally Darwinian-Wallacean in nature:

> My three-stage model: 1 the problem; 2 the attempted solutions; 3 the elimination, may also be understood as the schema of Darwin's theory of evolution. It is applicable not only to the evolution of the individual or ganism [this doesn't actually occur, since natural selection works at the genetic, reproductive level, but hell, we'll give Popper the benefit of the doubt and assume he means knowledge, or meme acquisition, as being responsible for differential survival] but also the evolution of species. In the language of our three-stage model, a change in either the environ mental conditions or inner structure of the organism
> produces a problem. It is a problem of species adaptation: that is, the spe cies can survive only if it solves the problem through a change in its ge netic structure [again, a problematic statement since genetic mutation is not a conscious choice]. Darwinism assumes that, in the terms of our model, these mutations function as Stage 2 attempted solutions. Most mu tations are fatal [yes]...But in this way they are eliminated in accordance with Stage 3 of our model. [But] If there were not very many mutations [human primates are nothing if not innovative], theywould not be worth considering as attempted solutions. (5)

Interestingly, biologist Richard Dawkins proposes a similar theory, analogous to his selfish gene theory (which proposes that organisms are automatons 'piloted' by their genes, which have the sole goal of propagation by any means necessary), in which memes, both harmful and beneficial [and therefore not perfectly adaptive], are passed down through generations, to be occasionally altered in a Lamarkian fashion (like the [incorrect] model of the giraffe who evolved a long neck via stretching it to reach the tops of trees) to affect differential survival of the 'host' organism. And this, in turn, provides Popper with his model of both scientific and literary theories as "our attempted solutions, our theories, and our hypotheses, [which] can be formulated and objectively presented in language, so that they become objects of consciously critical investigation" (8). And to think, that, before this moment, everyone had told me Popper was a black knight out to obliterate the very notion of human endeavor approaching objectivity. Ha! Well, it's true he believes objectivity doesn't exist. But he admits that the search for common truths is the core of all disciplines. And, true, his falsificationism can be seen as something of a challenge to the logical positivism of the historical 'Vienna Circle,' who perceived that only empirical observations conducted under the aegis of a visible mathematical logic were truly meaningful as tools toward knowledge and understanding. But Popper's perspective was highly necessary in proving that the 'demarcation line' of what makes science science is inextricably tied up as a fundamentally human attribute, rather than an external construction, fabrication or arbitrary principle, to be considered extrinsic to the human context.

One of the first to apply such an analysis to the physical sciences was a physicist by the name of Thomas S. Kuhn, who, in 1962, published *The Structure of Scientific Revolutions*, which examined how intellectual trends common to humanistic and scientific discourse periodically cause significant upheavals in the scholarly world. For example, using what is commonly called the Kuhnian Paradigm Shift, I could make the argument that Gould's theories of punctuated equilibrium (sometimes evolution can proceed at a rapid pace, rather than gradually) and contingency (chance plays a huge part in which creatures survive on this planet [think dinosaurs and asteroids]) contain marked similarities to literary postmodernism, a philosophy which contiguously resisted the older modernistic philosophy of exact, predictable, ordered theories and genres. Thus, Kuhn's long-awaited intellectual tool is exceedingly powerful because it beautifully illustrates the fundamental unity of the intellectual tools utilized by all forms of human and physical science; though our practitioners use a wide scale (lateral and unladder-al) of numerological/technological/textual methods, we are, as human scholars, reaching the same conclusions. Either way, it is simply the application of these conclusions to our various fields that obscures their fundamental agreement--not that everything is individual and meaningless, as with extreme postmodernism (which has since been carried back from the brink and reconciled with modernism anyway, in all fields), but that everything has one meaning, for one species, occupying one poorly-understood planet in a totally bewildering (if elegant) Universe.

Crucial to this purview is the study of history. As Kuhn points out, "History, if viewed as a repository for more than anecdote or chronology, could produce a decisive transformation in the image of science by which we are now possessed" (1). Kuhn saw the sciences as an elaborate patchwork, a "constellation" (1) to which various thinkers contributed data and causative explanations for that data in the continual quest for knowledge. And he is careful to note that, occasionally, a series of findings will obviate an entire school of thought (2), almost all at once, but that this absolutely does not mean that previous ways of understanding the world were not extensions of a common scientific endeavor: "Out-of-date theories are not in principle unscientific because they have been discarded" (3). Science isn't just "a process of accretion" (3): like natural selection, it can occasionally be subject to a Gouldian sort of intellectual upheaval, resulting in the creation of exciting new branches of intellectual life. And yet, for all that, someone relying today on a disproved classical theory in the modern world would not be a scientist (lets say he proposed a resurgence of the belief that woman was fashioned from some dude's thoracic rib), for the very reason that he is ignorant of history and the processes of science: he can neither prove nor disprove it, and meanwhile, there are more reliable theories out there. Lucky for us, the accumulated knowledge of "Observation and experience can and must drastically restrict that range of admissible scientific belief, else there would be no science" (4). On the other hand, scientists can make mistakes. Limited by our inherent subjective humanity, we assume we "know[] what the world is like" (5), and are sometimes led astray. Luckily, there is a massive scholarly community to rely on for

guidance, and if, by chance, you hit on an accurate but iconoclastic new theory (as with natural selection vs. creationism), science will "begin the extraordinary investigations that lead the profession at last to a new set of commitments, a new basis for the practice of science" (6), as free from bias as is possible in a human endeavor (which is to say it will not happen overnight). But even though such theorizing leads occasionally to stubbornness, it is still a vitally necessary part of the human process, for, "In the absence of a paradigm or some candidate for paradigm, all of the facts that could possibly pertain to the development of a given science are likely to seem equally relevant" (15). A paradigm, then, helps us sort through the al- most unimaginable amount of data we must, as human scientists, make sense of. And, as may be expected in light of this, "Both fact collection and theory articulation became highly directed activities" (18), including statistical analysis, which allows us to 'see' and gauge the data either as a clear pattern or a set of disparate observations, which help eliminate the tendency for researchers to inadvertently skew or "mop up" (24) their data in unconscious service of a dearly-held con- ceit. But, as Kuhn notes, it is only human nature to part only reluctantly from previously-held truths; which is one reason why the concept of paradigm shift needed to be articulated in the first place. For in the true spirit of science, theory "To be accepted as a paradigm...must [only] seem better than its competitors, but [and more importantly] it need not, and in fact never does, explain all the facts with which it can be confronted" (18)--there is always contingency, after all. But overall, examining the history of such theories can only help us be more objective and open-minded in our practices. And truly,

Kuhn seems to forget that the reason so many experiments are conducted with the framework of a paradigm in mind is because, according to Popper's empirical falsificationism, the ultimate test of a theory is that it cannot be disproved; consequently, one has to conduct rigorous research in the same area in order to be thorough.

But--perhaps most importantly-- Kuhn, as a longtime physicist himself, was quick to point out that science is fundamentally a manifestation of the human community. Its province is not limited to certain magisterically-sanctioned individuals. Rather, scientific "subjects, for example heat and the theory of matter, have existed for long periods with out becoming the special province of any single scientific community" (179). This does mean that "the application of values is sometimes considerably affected by the features of individual personality and biography that differentiate the members of the group" (185). But it also means that different groups will have differing perspectives, which will ultimately lead to a broader consideration of the topic, and a more balanced perspective, lessening the possibility that we're simply all looking at an issue in an a priori way. And though different human groups and communities are, by nature of their common culture, as a survival mechanism, trained from birth to interpret stimuli in a particular way (195), plunging into total relativism throws out the baby with the bathwater; ultimately, these variations add up to a unifying commonality: "Taken as a group or in groups, practitioners of the developed sciences are, I have argued, fundamentally puzzle-solvers. Though the values they deploy at times of theory-choice derive from other aspects of their work as well, the demonstrated ability to set up and solve puzzles presented by na

ture is, in case of value conflict, the dominant criterion for most members of a scientific group" (205). In other words, what makes us all human is our ability to use tools to solve problems (or 'puzzles').

As it turns out, the subject of scientists-as-humans is a common one (well, obviously) in the sociology of science. In *On Social Structure and Science* (1945, 1965; 1973, republished 1996) Robert Merton explores how the pursuit of science is often influenced by sociocultural factors. As a sociologist, Merton is particularly well positioned to negotiate the false divide between the science and the humanities, as "the social sciences stand between the physical sciences and humanities in their cumulation of knowledge" (25); he makes a point of lamenting (as does Gould) the tendency of many scholars, particularly in the physical sciences, to overlook original sources in favor of previously-digested discourse . But though he claims that "the physicist *qua* physicist has no need to steep himself in Newton's Principia or the biologist *qua* biologist to read and reread Darwin's Origin of Species" (30), he intimates that such scholarship is ultimately just as necessary to understanding the processes of science as familiarity with 'the original grand masters' of humanistic discourse is for humanistic study (for example, not understanding Aristotle would likely be considered a flagrant sin in most humanities departments). Original masters or not, however, both disciplines "are alike in perforce taking a single, all-embracing theoretical orientation which unifies the postulates of the discipline" (38) into a single, grasping TOE (theory-of-everything), but, as Merton notes, those oriented in such directions often face off in opposing camps, such as lumpers and splitters (biological cladists)

and Marxists and formalists (literary theorists), etc. Like Kuhn, however, Merton is keen to point out that academic paradigms do shift, and with them, the philosophical and theoretical orientation of the discipline concerned, whether scientific or humanist. For Merton, then, the pursuit of the physical sciences, like the pursuit of its humanistic counterparts, is ultimately a quest for knowledge. As such, it is amenable to being analyzed as a somewhat existential, human endeavor, dependent to some degree upon factors like social class (most scientists see themselves as being 'blue-collar' pragmatists), gender (Watson and Crick completely ground Rosalind Franklin's work into dust), and cultural mores (currently, cloning research is strictly monitored by the federal government and experimentation in human cloning is banned), and even, on occasion, religion: Merton makes an interesting case that the Puritan work ethic, because it demanded rationalism and thorough examination of one's beliefs, actually fostered scientific naturalism in 17th century England (227), particularly as a 'layman' activity (233). Thus, although modern studies can approach Bacon's famous goal of a knowledge base that "places all wits and understandings nearly on a level," scientists are human, and even empirical researchers must operate within the existential worlds in which they find themselves. As must humanists: Merton's explanation of an "Insider Doctrine" of disciplinary xenophobes can apply just as easily to them as to scientific specialists; scientists are definitely not the only old academic fogeys occasionally guilty of (even tacitly!) regulating who they allow 'into the club': Merton is even particularly keen on extending the blame to sociologists as well. Literary theorists are equally capable of creating a well-intentioned inventive theory

(*cough* formalists) that confounds and irritates scholars and students for generations to come. The dreaded maxims 'publish or perish' and 'publish early and publish often' apply just as well to humanism as they do to science. Similarly, in either field the youthful scholar is praised as being particularly erudite. And Merton's 'theory of multiples' is hardly science-specific: critics and philosophers advance basically synonymous theories on a regular basis. Ditto for slander, backbiting, usurpation, plagiarism, and scooping; just ask any literary or scientific conference attendee; in the academic world, things can get ugly in a hurry. But it's all the same to Silverstein's clam (*Where the Sidewalk Ends* 1975): though "man may sing his endless songs/of wronging rights and righting wrongs/ The clam just sets, and gets along/ it's all the same to the clam" (108).

Another prominent name in such studies is Bruno Latour, whose *Science in Action: How to Follow Scientists and Engineers Through Society* (1987) explores some of the professional issues facing modern scientists in their professional publications. Latour seeks to explain, for example, why scientists must rely on professional responses and continuing collegial referrals to their journal articles (particularly criticism and controversy) to ensure the longevity of their ideas. He also examines how such controversies generate increasingly technical language (Latour calls this 'stratification'), and how this 'fortified' language works to create networks of support between geographically isolated scientists. Latour is keenist when he turns his eye to 'captatio,' or the act of shepherding the reader toward one's corner via "subtle control of the objector's motives" (57--basically, anticipating their thoughts and using it to 'pen' them) and how, using his 'sec

ond rule of method,' we might trace the permutations of a piece of data (such as a graph) through its differential presentation, reproduction, and consequent interpretation. Much of what Latour says is accurate; like Merton, however, he is not quite *fully* explicit about one very important point: every one of his rhetorical analyses also applies to humanistic discourse. It is particularly easy to translate Latourian 'instrumentation' ("any set-up, no matter what its size, nature and cost...[that] is simple enough to let us follow scientists' moves [68]) from telescopes and electrophoresis gels and into theoretical frameworks, such as, say, the Lacanian mirror stage or Derridean linguistic analysis. In the same way that scientists will use the means of their data collection as "an inscription that is used as the final layer in a scientific text" (68), so literary theory acts to influence how the reader anticipates and interprets one's argument (if you know the theory or instrumentation being used, you might predict where the author is going or what they are seeking to prove), thus "lead[ing them] from the paper to what supports the paper" (69) like an anatomist moving from outer skin to skeleton. He then traces how these ideas, like preserved specimens, must initially be rhetorically shored up against the ravages of time and disciplinary distance (I'm not sure I like the analogy, as it implies that ideas are airless and dead, rather than vibrant and motile). They may also be cultivated in the guided 'botanical gardens' of the modern university, which add their own unique spin (so-called 'local knowledge'). He even advocates the incorporation of global knowledges under the University aegis as an 'observatory' of accumulated human knowledge (228). However, as Latour points out, the introduction of a particular theory opens up the opportunity for

criticism; particularly, I would argue, if one's choice of either physical/instrumentative or philosophical/theoretical frameworks is questionable. Seen in this light, Latour's oppositional 'theory laboratories' are analogous to scientific and humanistic 'schools' of thought (Marxist, formalist, poststructuralist, feminist, ecocriticist), his 'black box explanations' (processes with no explanation [which are actually quite rare in science]) are also (on occasion) the essential arcane assumptions of literary theory, and authorial rhetorical performance in science is the same as authorial rhetorical performance in literature. Latour's call to avoid verbal, nominal, and nomenclative intimidation (103) applies to obscure postmodern discourse just as easily as the scientific passive voice, and truly, that door swings both ways: scientists have railed against such discourse every bit as often as postmodernists have railed against scientific discourse [particularly Sagan in *The Demon-Haunted World* and Dawkins in *A Devil's Chaplain*]). Ask any grad student in the humanities: certain literary criticism can be every bit obscure as the odd overly-nominal scientific paper (particularly semiotics...). So, as it turns out, humanistic and scientific discourse, as well as their producers, are operating on the same fundamental level. (Hey, whaddayaknow? Turns out we're human after all!)

Latour's discourse also brings us to one of the hottest topics in the academic world: the rhetoric of science, which deals with how professional scientists communicate with each other and with the world. The rhetorical examination of scientific discourse is, at its core, a fundamentally helpful and illuminative branch of the human sciences, one that explores how scientists attempt to convey their theories and supporting data as being

valid and balanced. Rhetoric of science scholars correctly point out that this discourse, because it represents a profoundly human undertaking, often relies on the rhetorical arts as means of convincing the reader of the factuality of the argument. And though this would seem to be self-evident, a thorough, rhetorically-nuanced study can reveal many easily-overlooked discursive aspects, such as how the author rhetorically constructs his target audience (what he expects them to know, what beliefs he expects them to subscribe to, etc, as Charles Bazerman, Gay Gragson, and Jack Selzer do), an analysis of those things he omits (and why), an analysis of the confidence with which he makes his state ments (Latour and Woolgar), a test of Hermagorian stasis theory (to determine how his argument is presented for judgement by differing sets of critical audiences and their concordant classical figures of speech; Jeanne Fahnestock) or how an author attempts to shift the reader's cultural or conceptual perspective, often with techniques like chiasmus and polysemy (Kuhn, Leah Ceccarelli). Coupled with studies of the history, philosophy, and sociology of science, rhetorical study can demonstrate how science has evolved into the precise, elegant methodology that today comprises the modern sciences. and which renders them the sharpest, most efficacious mental tools human primates have ever known. Unfortunately, however, not all of these scholars tend to deal so fairly with their subject as their sociological and philosophical counterparts: Paul Feyerabend took Popper's philosophy as a misguided invitation to attack science as being an oppressive illusory institution, with no real meaning or relevance. I am here discussing him so as to first illustrate what most rhetoricians of science--whose field came to full prominence after Popper--are

not claiming, as well as to illuminate the fundamental problems with such a dogmatic argument, if it were, indeed popular. In *Against Method* (1975), Paul Feyerabend presents the idea that science "took over by force" (4), dominating its intellectual 'prisoners of war' by the institution of its 'extrinsic dogma'; Feyerabend willfully occludes the historical oppression of science and scientists to (quite laughably) relegate it to a means of utilitarian mental control, predicated solely upon arcane myth and selfishly-held power. He seeks to prove that 'western' scientific endeavor differs from 'traditional,' 'tribal' means of categorizing and explaining nature; however, in exploring African and Chinese mythology, herbology, and biological classification systems, Feyerabend proves that modern, institutional science and other forms of naturalism differ only in technological degree, and that, therefore, the physical sciences are only a manifestation of the common human drive for natural understanding. They are not an extrinsic, 'alien' implement at all, but only the common tool of a tool-using species. Feyerabend is absolutely correct in explaining, for example, that African mythology, like science, represents a "quest for theory," which itself represents "a quest for unity underlying apparent complexity" (4). Both attempt to provide a "theoretical superstructure" based on analogous relationships (4). Again, Feyerabend is not wrong: one need only look to theoretical physics to see the validity of his point. String theory, for example, is based on a simple analogy (subatomic components resemble tiny, vibrating, guitar strings behaving in an undulatory manner) and seeks to use this to explain the observable phenomena of the entire physical Universe in a 'simple,' cogent way, much as early humans sought to explain natural phenomena

with powerful deities or animal spirits: both are expressions of the same human drive. The major difference being, of course, that early peoples did not have the sophisticated tools necessary for comparatively eliminating these mistaken theories, as we do now: Feyerabend, unfortunately, refuses to acknowledge the essential primacy of both belief systems. He is right to point out that elements of Chinese medicine, such as acupuncture, have recently been recognized by western medicine. But he rejects any continuity between, say, non-western zoology and Linnaean classification, even when his so-called "Primitive tribes have more detailed classifications of animals and plants than contempo rary scientific zoology and botany" (12), thus completely overlooking the fact that such a common scientific impulse speaks to a common origin of scientific thought. Instead of representing these phenomena as being intrinsic to our human means of understanding, however, Feyerabend vilifies science as being "chauvinistic... anarchistic... unrealistic...[and] pernicious" (1-3). Worse, he offers no proof for his subjective tirade. He believes science "increases our professional qualifications at the expense of our humanity" (3) and forces us all to "submit to the meanest kind of (intellectual and institutional) slavery," which we apparently blindly adopt "without consulting, or arguing with, the inhabitants" (4). Most important of all, Feyerabend forgets that science is, if anything, a common universal language, because it represents the psychological root of a common meme, rather than a more variegated linguistic branch of 'Western' thought. Most unfortunately of all, however, is his tendency to sound like incarnation of A.R. Leavis, a man more interested in petty polarizing than pointing out the essential equality of

mankind. Because Feyerabend had most of his facts right; he simply allowed personal bias (rage over not getting first place for his volcano model at a 3rd grade science fair, perhaps?) and political ideology to get in the way of an otherwise valid, tool-centric, Popperian interpretation. (You see, Paul, we're all a trifle deaf in one ear; perhaps you should try to speak a little louder next time...)

Which brings us to Alan Gross, one of the most recognizable players in the contemporary field. His *The Rhetoric of Science* (1996) is still a go-to text for its eponymous scholarship, and offers a nuanced critique of scientific discourse and procedure (much of this book was retooled into *Starring the Text: The Place of Rhetoric in Science Studies* [2006]). Gross aims to debunk Aristotelian bias, which traditionally privileges the language of science with notions of objective superiority, thereby railing against a world in which the usage of rhetoric "is considered an intellectual step down" (206). He claims that, like other forms of rhetorical argument, the language of modern science is deeply rooted in historical and philosophical precedent. This, he believes, renders science categorically indistinguishable from other written forms. Gross points out that modern scientific language is characterized by an adherence to "an object-centered world" which stresses "material objects rather than people as its center of interest" (*xxix*). Rarely, if ever, are personal pronouns encountered. Efficient comprehension is the rule; between a humanistic and a scientific text, therefore "the average sentence length and clausal density within a sentence [are expected to] decrease" (*xxix*). Science, too, is supposed to deal in brute facts (11), phenomena operating outside and independently of flawed human in

terpretation. As such, there can be no room for subjective analysis or fanciful wordplay; incorporating rhetorical style is believed to detract from the autonomy of fact. Gross challenges both these perceptions with a close reading of various scientific texts, both ancient and modern. Within the norms of scientific discourse, he argues, can be be found the rudiments of rhetorical form.

For Gross, the very presence of an accepted scientific format itself dictates a reliance upon rhetoric, since hierarchical placement outside the "the province of rhetoric" depends upon "their presumed correspondence to the laws of thought" (16), an arbitrary set of philosophical phenomena. He notes that scientific textbooks insist upon "incorporat[ing] all useful past science" and "commend[ing] accepted methods" (11), a technique which falls in accordance with the epideictic rhetorical style. Further, he adds, our theoretical sciences remain largely unconfirmed, depending, as in the case of "quarks or gravitational lenses," upon logical "persuasion" (3) and spirited debate. In crafting cogent explanations for phenomena observed during experimentation, "scientists must make up their mind about what needs to be explained, what constitutes an explanation, and how such an explanation constrains what counts as evidence" (7). Thus, they are effectively "deciding what it is to do science" (7). This is stasis theory, a rhetorical means by "which we can orient ourselves in a situation that calls for a persuasive response" (7). For Gross, this is evinced particularly well by taxonomic studies: he claims that "speciation depends less on statistical inference than on a fundamental presupposition that about the existence of species in the order of nature," a "continuity within, and discontinuity between, spe

cies" (44). Gross utilizes Fitzpatrick's hummingbird studies (1980) to illustrate his point: because Darwinian theory presupposes the existence of an intermediary species between two distant species of hummingbirds (via allopatry), Fitzpatrick was able to look for and discover *Heliangelis regalis* and define the entire species by means of only sixteen 'arbitrary' physical characters. In other words, because the bird was supposed to be there, it was; this "unequivocal contact..between a theory and the naked reality whose working it accurately depicts, is a rhetorical, not a scientific, conviction" (11). He makes a keen point here: the 'true' definition of what we call a species is tenuous at best; if we accept the definition of non-interbreeding populations as being separate species, what do we do with lions and tigers, who occupy separate continents, yet will readily mate to produce viable offspring? Anyway, the data doesn't change; but the 'obvious' patterns *can*.

According to Gross' anatomy, then, "Scientific style remains oxymoronic at its core: modest in its verbal resources, heroic in its aim"; thus, "Tropes like irony and hyperbole are barred" (17). Tropes like metaphor and analogy, however, abound. When the structure of deoxyribonucleic acid (DNA) was discovered by Watson and Crick in 1953, the genetic data the molecule was theorized to contain was referred to as a 'code,' the base pairs as 'codons.' The analogy presupposes that each codon unit translates directly into a coherent biological message: a mental precedent which caused the discovery of 'nonsense' codons and 'junk' DNA to be unexpected, and thus, met with surprise. In a similar way, texts on cellular physiology feature metaphorical descriptions (and even illustrations) which refer to proteins as 'pumps' and metabolic reactions as 'cascades,' a

highly rhetorical "way of talking that turns living cells and processes into their mechanical and computorial counterparts" (81). Such metaphorical usage can be traced back to thinkers like Descartes, who used the metaphor of grapes pressed through a strainer to illustrate "the geometric properties of sunlight" (113).

As it turns out, a great many features of the modern scientific paradigm can be traced to Cartesian and Baconian rhetoric. According to Descartes' philosophy, the goal of science is "absolute certainty" (116). Indeed, the 'primacy' of reason itself represents a sea-change in global thinking, a trend that can be traced back to Enlightenment rational ism. (Even Foucault notes that modern science is a logical extension of these philosophies.) The so-called Scientific Revolution (itself a somewhat disputable term) is often figured to have required a major transformation of values; as such, these principles cannot be considered independent of human philosophical 'subjectivity.' Gross (dis)credits them both with propogating "the myth" of infallible rational induction (116), a theme embodied in the formatting of the modern scientific report; in other words, journal design reflects a rhetorical style.

Not all of Gross's argument rings true, however. Firstly, not all science is as abstract and esoteric as quantum physics; the vast majority of its tenets can be proved and demonstrated, whether in nature or in the lab. His Proppian analysis of the Watson and Crick 'fairy tale' is less than convincing: that a historical narrative resembles a formal literary structure does not in itself prove that the entire proceedings of the parties concerned can be reduced to an empirically meaningless string of plot devices. In addition,

his occasional metaphysical turns give any educated reader good reason to bristle; the rhetoric of scientific discourse may be analyzed to shed light on how modern science proceeds, but it does not create reality, or mean that scientist-magicians can only discover ('make real') those scientific principles they have already fabricated (if that were the case, there would be no penicillin). In these few aspects, Gross has clearly stretched the postmodern milieu a stitch too far. And, to tell the truth, he knows it. In "What If We're Not Producing Knowledge?" he acutely feels the sting of Dilip Gaonkar's criticism that because his knowledge "can demonstrate virtually anything, it can demonstrate absolutely nothing" (147). Gross chooses to take this criticism as "an admonishment" (153), and admits that the field needs to be standardized in some way that organizes the heaps and heaps of case studies currently composing the field. Curiously, he is also concerned with returning to primary sources in order to get an edge in what he terms the "ongoing contest for intellectual status between the rhetoric and the history and philosophy of science" (153) for who has earned the right to be accepted by the wider academic world. This fight is worthy of being fought. And the fight is still ongoing.

But first, one important caveat: to treat rhetorical, philosophical, or sociological analysis as a reducing agent means that all such fields are so reducible--right down to the point of nihilism-- rendering such scholarship just as flawed as Wilsonian hyper-reductionism. In yet another fun way, then, overzealous humanistic scholarship is categorically no different from overzealous scientific varieties; in the words of Bazerman, such authors "have exposed us all as charlatans" (*Shaping Written Knowledge* 11). For if

we've all been universally discredited as having no right to make any claims at all, why bother having a university? Because, as writers, being self-aware of our subjectivity means "simply knowing what you are doing, not undermining what you do" (12); just because Copernican theory was only understood by few at the time of its inception doesn't mean that the earth didn't move; it revolved around the sun long before the birth of Galileo (or man. or the moon. or even life). All in all, my biggest criticism of Gross and his ilk is that readers can easily become convinced that he is implying the opposite...luckily, most scholars avoid such overreaching. But when it does occur, our best strategy is to take it in stride, dig in our hedgehog heels, and shout:

E pur si muove!

Such hedgehoggery is also helpful when dealing with religion.

CHAPTER 6

SYMPATHY FOR THE DEVIL: THE SPECTER OF RELIGION IN THE POPULAR SCIENCE NARRATIVE

"Religion? Oh, there's a thin line between Saturday night and Sunday morning."
-Jimmy Buffett, "Fruitcakes"

"The Devil is the last great humanist."
-Anonymous

Many scientists (including human ones) love to jack with the devout. It is, frankly, pretty darn irresistible, considering that the sciences (physical and human), as the natural successor of explanatory religion, represent a far more accurate and precise tool for human understanding. This doesn't mean religion should be despised, of course: modern biology arose in large part from the efforts of extremely intelligent religious naturalists, such as Francis of Assisi--rhetoricians and historians like Harmon, Reidy, and Gross have done an excellent job of tracing the lineage of the modern scientific article back to some of its roots in theological naturalism. Beginning in the 19th century, however, science came to be viewed by a humanistic faculty (heavily composed of aristocrat clergymen) as being the antithesis of religious thought and endeavor. This stemmed largely from the (patently false) belief that religious education conveyed morality, patriotism, and a sense of civic duty. It was also a case of striving to claim intellectual territory

before science had its say in the matter, and (as the clergical humanists feared) usurped their professional arena. In reality, however, the human primate bases for morality have always been a matter of both human and scientific interest, and, like religion, the sciences have always sought to find an explanation for them. The difference, of course, is that re ligion usually offers only artificial explanations (such as 10 heavenly 'commandments' literally received *Deus ex machina* by one Hebrew man on two small pieces of stone [give me a break]), while science can propose how certain of these same tenets arose naturally and even, at least to a certain degree, adaptively, among all humans, via the evolution of our bioculture, over millions of years. For though the science/humanism/ religion conflict seems today to be a beast apart from the interdisciplinary fisticuffs explored earlier, the roots of the conflict betray a strong underlying connection between all three, a topic about which many prominent scientists have written, including T.H. Huxley. Such narratives reveal some interesting details about the author's motivations for writing them; even before Huxley, scientists were applying the rigors of the scientific method to disprove religious superstition and pseudoscience. In continuing these traditions, however, Huxley writes in *Science and Christian Tradition* (1899) that he quickly found himself being attacked as possessing a virulent "hatred of Christianity" (vii). Like many scientists before and since, he believed that the supernatural realm, because it could not be proved, was nonexistent, thus, "It really is my strong conviction that a man has no more right to say he believes this world is haunted by swarms of evil spirits, without being able to produce satisfactory evidence of the fact, that he has a right to say, without adducing

adequate proof, that circumpolar antarctic ice swarms with sea-serpents" (xiii). Further, "Without the belief that the present world, and particularly that part of it which is consti tuted by human society, has been given over, since the Fall, to the influence of wicked and malignant spiritual beings, governed and directed by a supreme devil--the moral an tithesis and enemy of the supreme God--their theory of salvation by the Messiah falls to pieces" (xv). For Huxley, "The question for me is purely one of evidence: is the evidence adequate to bear out the theory, or is it not?" (xvi). In matters of the Bible then, only historical and anthropological study is necessary, for nothing should be taken 'on faith,' or as 'moral edification': "either Jesus said what he is reported to have said, or he didn't" ("Agnosticism" 218). Ditto for Biblical events. Thus agnosticism "in fact, is not a creed, but a method, the essence of which lies in the rigorous application of a single principle" (245). Huxley, then, saw theism and atheism as rigid creeds, which would be unable to adapt if, say, new evidence arose to verify either claim. However, Huxley did not condemn false creeds as being inherently harmful: for "if a man can find a friend, the hypostasis of his hopes, the mirror of his ethical ideal, in the Jesus of any, or all, of the Gospels [or in any creed], let him live by faith in that ideal...But let him not delude himself with the notion that his faith is evidence of the objective reality of that in which he trusts" (245). In other words, just because you believe it, don't expect anyone else to. And definitely don't think that your creed is 'right,' except for you yourself, in the context of your own life, because there exists both a universal reality and a scientific truth, one that is constantly renewed by consistent experimentation and subject to the rigors of scientific

discourse. Again: science is subject to change based on evidence: creeds, on the other hand, are not, as witnessed by the frightening ease with which they become dogma. Sometimes these creeds are even disguised as pseudoscience, as with eugenics or phrenology, both of which were disproven with science, rather than any moral dictate; although, in fact, the two often align to the exclusion of religion: after all, scientific technologies such as stem cell research are proven effective by medical science--and are potentially beneficial to all mankind--but are commonly opposed by the Christian right as being 'immoral' (most likely because such technologies represent a far more accurate means of healing than religious faith or prayer and represent a challenge to its leaders). Interestingly enough, the interpretation of Darwinian scientists as antihuman 'social darwinists' has, from its inception, been completely unfounded. In published prefaces to his own 1886 Romanes lecture (why is it always a Cambridge lecture?) "Evolution and Ethics: Science and Morals," Darwin's bulldog makes it clear that, though "[he] see[s] no reason to doubt that, at its origin, human society was as much a product of organic necessity as that of the bees" (26), human society "is the product of organic necessities of a different kind from those upon which the constitution of the hive depends. One of these is the mutual affection of parent and offspring, intensified by the long infancy of the human species. But the most important is that tendency, so strongly developed in man, to reproduce in himself actions and feelings similar to, or correlated with, those of other men" (27-28). Frankly, even if humanity were to engage in eugenics, it would be ill-prepared to judge who or what was fit to be merited as being beneficial to society: "there is no

hope that mere human beings will ever possess enough intelligence to select the fittest" (34). In fact, Huxley argues, if you were to pick the fittest organisms as alone being wor thy of inhabiting the planet, only "lichens, diatoms, and such microscopic organisms [especially bacteria]," because they are "the best adapted,...would survive" (81). For Huxley, a Manichean means of social pigeon fancying is impractical because the rules determining success in affluent human societies are no longer directly analogous to those observed in nature (36); our tool use has paradoxically removed us from the direct-line-of-fire dictates of natural selection. In such a society, then, violent "ape and tiger" methods of existence are incompatible with the human ethicolegal systems that have enabled us to achieve this partial detachment. (Intriguingly, Huxley predated Dawkins in believing that such moral codes are memes, traveling from one "fleshy tabernacle" [61] via one's hereditary lineage [basically, one adopts the attitudes of one's parents based on their teachings during one's upbringing]). All things considered, though Huxley did believe in the validity of evolutionary ethics, and that science could dictate where many of our moral principle originated, he also believed that it was possible for scientists to misinterpret such origins if they assumed human societies to be no different from the streamlined utilitarianism of the insect kingdom.

However, the issue of morality does raise an important point in the historical relationship of science with academic studies of prescriptive human values: they are not so disparate as many of us have been lead to believe. T.H. Huxley, for example, saw nothing strange in writing about *Science and Christian Tradition* or *Science and Hebrew Tradi*

tion (both 1899). Nor did his grandson, biologist Julian Huxley, find anything odd or disciplinarily reprehensible in writing his *Touchstone for Ethics* (1947), which consisted largely of a series of familial Cambridge Romanes Lectures highlighting the differences of perspective between them. T.H. preferred an inherent, "intuitive," almost instinctive basis for 'moral' behavior, while Julian favored a hypothesis based on individual experience; if you oversimplify this, you get the classic 'nature vs. nurture' debate. (Animal behaviorists and human psychologists still examine this scientific question today, and usually come down somewhere in the middle.) Even more interesting, though, was the ease with which Julian Huxley discussed the relative merits of moral philosophy, providing an engaging and informed discourse on Locke, Rousseau, Hume, and others. And all of this is particularly interesting in light of the fact that, meanwhile, back at the humanistic ranch, morality was believed to be so bound up with the teaching of literature that the teaching of science could only lead to immoral activity. This was especially fueled by popular humanistic perception of Dawinian theory as being instructive of nihilism, godlessness, and selfish behavior, thus promoting the widely-believed concept of the "moral superiority of the humanities" (Cohen 287). The issue of the perceived "antithesis between progress and morality" (286) was exacerbated by the atrocities of Nazi Germany, which the public viewed (quite falsely) as being indicative of the moral failings of a scientific outlook (Nazi philosophy being based, after all, on false pseudoscience, bigotry, and occult learnings, rather than science). But sadly, even in 1960's Britain, the associa

tion of humanism with morality had not abated: in "Huxley and Humanism," one Irish literary critic decries 'scientific humanism' (as embodied by the biologist Sir Julian Hux ley's "Why I Am a Scientific Humanist"), casting the entire humanistic discipline as profoundly Christian, and therefore, profoundly threatened by the rise of science:

> The really important conclusion, however, is that a good word like 'hu manism' must be defended. Unless Christians bestir themselves to show that the Christian view of man ad the world are included in the true con cept of humanism they may discover, too late, that the word has become yet another shibboleth of the forces of materialism and atheism. (*Studies*, Autumn 1960, 260)

Now, I don't take Mr. M.B. Crowe's opinion to be that of all mid-twentieth century humanists: that way madness lies. But even Leavis believed that "A scientific education alone was the very antithesis to such a firm grounding in moral culture" (Cohen 289). And shibboleth--*yowch*! There are few ancient religious terms so damning (and downright amusing) in the modern parlance, especially when aimed at the discourse of science (especially considering its oxymoronic usage). Today, of course, humans are more aware of the diverse values of their fellow man, and 'morality,' in the sense that Crowe and Leavis had grasped it, has been, apart from its scientifically-approved egalitarian associations, mostly debunked as a set of western, Christian cultural perspectives (homosexuality *bad*, abortion *bad*, etc), and has therefore been largely decoupled from education (its fading last bastion as a formal subject is the occasional traditionalist Catholic high

school). Nevertheless, the stigma still lingers, and even scientists like Dawkins are still mistakenly accused (largely by inherently biased white Christian 'moralists') of being 'immoral': everyone should read the Christian letters he receives, gleefully describing how they'd love to 'spill Dawkin's intestines' or 'start a holy war for Christ' to wipe out scientist 'fag/dyke/satanist/cheese-eating surrender-monkeys'; they're guaranteed to brighten your 'immoral' day. For though nowadays most human sciences accept that the physical sciences have something to say on the subject of ethics and morality, there is still something of a tug-o-war implicit in the issue of who gets to declaim on the subject, and still some touchy indignation when empirical science gets too close to the nerve-center of human moral reality.

But morality is human, and therefore scientific, in nature. Remember what I said about theory in the third chapter: if science can explain morals more accurately than religion, it will render religious explanations of human ethics obsolete. And, as it turns out, it does. It's easy to apply relatively new studies of mammalian altruism (the implicit promise of 'scratch my back and I'll scratch yours', or the simple truth that 'I warn/share with/protect my family because they carry and propogate my genes') to human society (particularly those noisome suburban breeders with nothing but verbose adoration for their noxious offspring). We can also explore how notions of morality often (though not always: don't get all adaptationist on me) work to increase survival. Further, biology simply teaches us that our 'purpose' (an unnecessary word to begin with, since evolution, the process by which we came to be here, is blind and unguided) is to ensure optimal fit

ness for our genes, either by reproducing ourselves or helping our family groups (altruism). Ironically, this is the same message the Christian Bible (and many other creeds, besides) transmits when it declares: go forth and multiply. And help your parents. And don't kill your siblings. Our values, then, are those that most help us achieve this: taboos against fratricide, patricide, and incest (which results in transmission of deleterious recessive alleles rather than their more commonly beneficial dominant counterparts) are the most strongly upheld in human societies. Conversely,'revenge' and 'murder' (which do not directly affect fitness) are relative, particularly if they occur outside your family/tribal group: among many human societies, to avenge a death by repaying in kind is right and honorable; to refrain is to demonstrate a critical weakness of values (and I'm not just talking about obscure Amazon tribes). What is even better about these studies is that they are backed by a united front: behind our lines, philosophers and biologists are able to switch roles, almost effortlessly adopting one another's territories and principles. (More great news for a united academia!) I take as my exempla Daniel Dennett's *Breaking the Spell: Religion as a Natural Phenomenon* (2006) and Marc Hauser's *Moral Minds: The Nature of Right and Wrong* (also 2006). Technically, Dennett is the philospher and Hauser the scientist; but you wouldn't know it to read their books: Dennett is dispassionate in his dealings with bogus (as well as helpful) religious prescriptives and sundry bullshit, steadfast in his belief that the eponymous "spell that I say must be broken is the taboo against a forthright, scientific, no-holds-barred investigation of religion as one natural phenomena among many" (17). Hauser, meanwhile, is completely at ease discussing

Kantian (brain [logic]) Humean (heart [emotive]), and Rawlsian (eyeball [instinct]) creatures, and their concomitant moral logics. Essentially, Dennett argues that, while religion is an important impetus for group cooperation and bonding, it is also responsible for the gruesome side of human history in truly horrific proportions, thus rendering it an important social phenomenon, but not a valid foundation for moral reasoning. Particularly interesting is his important observation that religion is viewed as central and untouchable in the United States, but not in any of its European counterparts: here, it seems, we are still emerging from the bad old days of religiously dogmatic university politics. As with radical Islam, American Christo-morality is better viewed as a parasitical brainworm/meme than a perspective (4). (In the Humean tradition, he contends that basic spirituality or sublime appreciation of the natural world is hardly religion; only abject submission to a godhead counts as reprehensible.) Dennett is also quick to point out that there exists no valid reason why science cannot approach the study of religion. Though "Up to now, there has been a largely unexamined mutual agreement that scientists and other researchers will leave religion alone" (18), science and the humanities are clearly more than capable of examining the psychology, psychiatry, anthropology, literature, architecture, and economics of human religion (29). Further, there is no valid reason why atheists should be "less caring, less moral, less committed to the well-being of everybody on Earth than somebody who believes in 'the spirit'" (305); moral reasoning is an essential, secular human act. Perhaps no one is better at enunciating this concept than Marc Hauser: he used examples from zoological and ethological altruism studies, brain injury neurosci

ence studies, and Footian logical reasoning to develop his idea of an instinctual moral gra mmar, an "exquisitely designed organ" analogous to the innate language capability studies of Chomsky. Needless to say, this is a vision of morality utterly divorced from organized religion, and utterly appropriate for empirical academic study by both the humanities and the hard sciences.

Of course, there are dissenting voices. Even Stephen Jay Gould, who famously invoked humanistic exempla in service of illuminating scientific models, believed that nature can teach us nothing about morality or morals. In "Nonmoral Nature" (*Hen's Teeth and Horse's Toes*) Gould claims that, if nature can permit the existence of parasitic wasps, whose females lay their eggs inside the bodies of caterpillars, which then hatch out and proceed to eat the caterpillar from the inside, thus resulting in a slow, agonizing death for the caterpillar (weird, but true), nature cannot be looked to as a source of moral illumination. Gould is right, up to a point. No, perhaps we cannot learn too much about primate morality from insect models; nor, obviously, should we become Benthamites modeling ourselves after the insect kingdom. Humans are not bees, after all (we're more like ants ;P). But Gould was overlooking the fact that we can learn a great deal about 'natural' morality from our vertebrate, mammal, and primate relations, creatures whose lifeways and brains bear more of a resemblance to our own. So he was, sadly, wrong, in assuming that nature and human morality were completely divorced from one another.

Now that we've examined nonreligious moral nature, I think it might be fun to take a peek at other popular science perspectives. As you might well imagine, the scientific narrative is far from unilateral in its approach to religion as a scientific study: its undertakings range from total dismissal to cringing, reifying retreat. Such variation is a key indicator of how science is still in the process of reclaiming a once taboo subject matter; not all scientists agree on how far science can push the sacred envelope. But there are some who believe total domination is not only possible, but necessary for true scientific analysis. First, let's start with *the brights*. Founded by Richard Dawkins, the *the brights* are a somewhat pugnaciously-titled group of outspoken atheists whose moniker serves to indicate their beacon-like message of liberation (membership does not extend only to physical scientists: Daniel Dennet counts himself among their ranks as well). And so, as previously mentioned, Dawkins' is an attitude of total disdain for the supernatural and its entire accompanying mythos; *The God Delusion* provides witty and ample rejoinders to arguments for the existence of a godhead, with careful explanations of how religion effectively castrates society's ability to take responsibility for itself, thereby harming us (especially our children) far more than it helps. Dawkins' language is, as one might expect, somewhat inflammatory, jocular, and not a little cocky, allowing him to deploy his grandiose scheme for readerly 'conversion' with consummate ease:

> If this book works as I intend, religious readers who open it will be atheists when they put it down. What presumptuous optimism! Of course, dyed-in-the-wool faith-heads are immune to argument, their resistance built up over years of childhood indoctrination using methods that took centuries to mature (whether by evolution or design). Among the more

> effective immunological devices is a dire warning to avoid even opening a book like this, which is surely a work of Satan. But I believe there are plenty of open-minded people out there: people whose childhood indoc trination didn't 'take', or whose native intelligence is strong enough to overcome it. Such free spirits should need only a little encouragement to break free of the vice of religion altogether. (28)

Irregardless of the fact that the 'free spirit' to whom he has catered the work was already straddling the religious fence, and that the aforementioned devotees will likely never 'convert' (itself a rather speciously religious term for a scientist), the design of the book is genius: the preface reads like a comprehensive phone menu of anti-theological arguments for almost every angle of religious inquiry:

> Perhaps you feel that agnosticism is a reasonable position, but that atheism is just as dogmatic as religious belief? If so, I hope Chapter 2 will change your mind, by persuading you that 'The God Hypothesis' is a scientific hypothesis about the universe, which should be analyzed as skeptically as any other....Perhaps you think there must be a god or gods because anthro pologists and historians report that believers dominate every human cul ture. If you find that convincing, please refer to Chapter 5, on 'The roots of religion,' which explains why belief is so ubiquitous. Or do you think that religious belief is necessary in order for us to have justifiable morals? Don't we need God, in order to be good? Please read Chapters 6 and 7 to see why this is not so. Do you still have a soft spot for religion as a good thing for the world, even if you yourself have lost your faith? Chapter 8 will invite you to think about ways in which religion is not such a good thing for the world. (24-25)

Talk about eviscerating sacred cows (and right on--cows are stupid and delicious); given the comprehensive, kudos-worthy nature of Dawkins' argument, true "faith-heads" could not help but be offended. There's no denying that Dawkins' argument is boldly toothsome; like Wilson's, it is an argument 'designed to foster interdiscipinary conflict,' determinedly negating false hypotheses in a scientific fashion. Chapter 5: "The Roots of

Religion," for example, explains how the Darwinian Imperative encompasses human religious impulses, which are (or were) evolutionarily adaptive. Chapters 6 and 7, meanwhile, deal in morals, exploring how human morality constitutes a complex form of mammalian altruism. Although theology is not an academic discipline, Dawkins' prose does tea-bag (perhaps potato-sack? Dawkins' intellect can be quite pendulous) more than a few 'intellectual' believers.

But even scientists have their demons. Not only that: we appear to cherish their literary nomenclative significance--a hundred-odd years of being demonized by false religious 'humanists' will do that to you. In *A Devil's Chaplain* (2003) Richard Dawkins explains how the eponymous term, first coined by Darwin, comes to represent popular perception of "the cruelty, and the clumsy, blundering waste" of "the selfish replica[tion]" (11)--of *Selfish Gene* renown (basically, we are motile machines designed to carry and propagate our chromosomes)--inherent in a world of natural selection. Dawkins insists that, bleak though this reality may be, mankind represents "the only potential island of refuge from the implication of the Devil's Chaplain" (11): to achieve this, we must embrace "the daemonic alternative": we must shed our "comforting delusions" and "no longer suck at the pacifier of faith in immortality" (13). In this way we might "face[] up to what existence means; to the fact that it is temporary and all the more precious for it" (13).

And speaking of Charles Darwin--what did he think about the Christian faith, that great grandaddy of them all? Where did he stand on the whole god hypothesis? Tomes

and *tomes* have been written on the subject, but here's my take, based on his *Autobiography* of selected letters (edited by his son, Francis). Though he famously saw no reason why evolution should obviate the existence of a godhead, he also fought against 'naturalists' who believed that natural laws conveyed divine purpose ("Letter to W. Graham," 1881). He also disagreed with any notion of 'designed laws,' seeing no difference in the essential nature of a man and a gnat:

> An innocent and good man stands under a tree and is killed by a flash of lightning. Do you believe (and I really should like to hear) that God designedly killed this man? Many or most persons do believe this; I can't and don't. If you believe so, do you believe that when a swallow snaps up a gnat that God designed that that particular swallow should snap up that particular gnat at that particular instant? If the death of neither man nor gnat are designed, I see no good reason to believe that their first birth or production should necessarily designed. ("Letter to Asa Gray", July 1860).

Ladies and gentlemen, esteemed members of the jury: shit happens, and trying to ascribe divine will to it makes about as much sense as pissing into the wind; you'll only end up right back where you started. In fact, the more Darwin thought about it, the less sense a godhead made: Darwin began *On The Origin of Species By Means of Natural Selection* a Theist, "and it is since that time that it has very gradually, with many fluctuations, become weaker" (66). You see, Darwin wasn't as much of a hothead as many of us scientists (*cough*); he kept a very open mind, and was methodical (like a great bearded tortoise, he was nothing if not introspective) in reaching all his conclusions. He said nothing lightly. He pointed out that the notion of a godhead was vastly diverse among humans, and concluded that a Christian-centric theological debate was ludicrous. And so,

like Gould and Huxley, he said, “I for one must remain an Agnostic” (1879). But the man still had his demons. For as always with Darwin, the devil’s in the details. Because Darwin didn’t really view the natural world, once devoid of human supernatural hangups, as being devilish at all. He worried a bit about it, sure (is there anything Darwin didn’t worry about?), but ultimately believed that, quite frankly, human appreciation for the natural world was tantamount to any religious experience humanity could muster up in support of theism. He wrote that “The state of mind which grand scenes formerly excited in me, and which was intimately connected with a belief in God, did not essentially differ from that which is often called the sense of sublimity; and however difficult it may be to explain the genesis of this sense, it can hardly be advanced as an argument for the existence of God, any more than the powerful though vague and similar feelings excited by music” (“Letter to a Student” 1879). In other words, ‘god’ is the Devil’s Chaplain, and ‘it’ is a psychological epiphenomena associated with primate aesthetic appreciation and creative imagination, so quit worrying about it already! By the way: ever notice how the devil is usually the harbinger of constructive human knowledge? The Devil’s Chaplain doesn’t command us to despair in a godless universe; he asks us simply to know ourselves.

Even Carl Sagan--who, as an astronomer, is somewhat removed from the biological implications of human origin and morality--has concerned himself with the relationship between science and religion. In *The Demon-Haunted World: Science as a Candle in the*

Dark (1996), Sagan takes issue with the apparent inability of religion to question its hypotheses:

> Which leaders of the major faiths acknowledge that their beliefs might be incomplete or erroneous and establish institutes to un cover possible doctrinal deficiencies? Beyond the test of everyday living, who is systematically testing the circumstances in which traditional relig ious teachings may no longer apply?...What sermons even-handedly ex amine the God hypothesis?...Miracles are attested, but what if they're in stead some mix of charlatanry, unfamiliar states of consciousness, misap prehensions of natural phenomena, and mental illness?...The fact that so little of the findings of modern science is prefigured in Scripture to my mind casts further doubt on its divine inspiration. (35)

While Sagan laments that religion cannot stack up to the rigors of science, he claims that "tenets at the heart of religion can be tested scientifically," and "This in itself makes some religious beaurocrats and believers wary of science" (275). For example, "Is the Eucharist, as the Church teaches, in fact, and not just as productive metaphor, the flesh of Jesus Christ, or is it--chemically, microsopically, and in other ways--just a wafer handed to you by a priest?...Does an uncircumscribed Jewish man fare worse than his co-religionists who abide by the ancient covenant in which God demands a piece of foreskin from every male worshipper?" (275). For Sagan, all these claims may be empirically tested, and thereby disproved; but while most theology has retreated to the 'safe' realm of moral and metaphorical interpretation (for example, "Modern Roman Catholicism has no quarrel with the Big Bang...although it has special opinions on 'ensoulment'" [278]) "conservative and fundamentalist" groups "have chosen to make a stand on matters subject to disproof, and thus have something to fear from science" (277).

For Sagan, such "rigid, doctrinaire religion" is no different from the pseudoscience he makes a point of lampooning throughout the work (20). In fact, without the guiding principles of science to light the way, "Religions are often the state-protected nurseries of pseudoscience" (15). Though Sagan is willing to grant religion a certain majesty, he insists that it submit to the rigors of the reductionist paradigm. And although the empirical tools of physical science cannot apply to all aspects of existence, "it seems foolish to complain about reductionism" (274). Especially when:

> It is not a deficiency but one of the chief triumphs of science. And, it seems to me, its findings are perfectly consonant with many religions (although it does not prove their validity). Why should a few simple laws of Nature explain so much and hold sway throughout this vast Universe? Isn't this just what you would expect from a Creator of the Universe? Why should some religious people oppose the reductionist program in science, except out of some misplaced love of mysticism? (274)

According to Sagan, by refusing to play by the rules of science, religion concedes defeat. This, of course, sets science apart and above, as a sort of regulatory board for allowable religion (which sounds a bit kooky to me, especially since I'm not a reductionist, but I guess I'll put up with it). This position is confirmed by Sagan's discussion of Aquinas, who could not reconcile classical theology "without some supervening organizing principle, some superior way to know the world" (274-5). Thus, when it comes to religion, science is best used "as an error-correcting device" (275).

All of this is particularly interesting in light of the fact that even Wilson--the apparent van Pelt of 'intellectual poaching'--is ready to play ball with the theologians. Wil

son is a self styled secular (scientific) humanist, who rejected outright the legitimacy of religion. Which is why it is surprising to find that, in *The Creation: An Appeal to Save Life on Earth* (2006), Wilson explains that only through a joint effort between science and religion can the planet and its biological wealth be spared from a human-engendered armageddon. He makes a point, in fact, of addressing his text directly at the belly of the beast: a Southern Baptist. In his "Letter to a Southern Baptist Pastor: Salutation," Wilson concedes that he "will not agree with all that I say about the origins of life--science and religion do not easily mix in such matters--but I like to think that in this one life-and-death issue we have a common purpose" (8). Rather than claiming that his magisteria holds a valid claim over the religious realm, Wilson proposes a mutually productive parlay:

> Does this difference in worldview separate us in all things? It does not...Let us see, then, if we can, and you are willing, to meet on the near side of metaphysics in order to deal with the real world we share. I put it this way because you have the power to help solve a great problem about which I care deeply. I hope you have the same concern. I suggest that we set aside our differences in order to save the Creation...Pastor, we need your help. (4)

Such politesse is a far cry from the sort of *scientia vincit omnia* attitude commonly associated with *Consilience*. Unlike some of his scientific counterparts, Wilson perceives the leaders of the faithful as empowered coevals, brothers in arms capable of enacting real, palpable change, claiming that "religion and science are the two most powerful forces in the world today" (5). The declaration is immediately preceded by a question: "You may

well ask at this point, Why me?" (5) and followed by a declaration: "If religion and science could be united on the common ground of biological conservation, the problem would soon be solved" (5). The vital subtext: ' I stand as a leader of the sciences, and extend to you, my worthy sometime enemy, a proposal of alliance that only myself, as spokesman for my magisteria, is authorized (or powerful enough) to make successfully.'

But again, why reach out in this manner? Why to a Southern Baptist? Why not a priest or a rabbi? And why, though "We have not met, yet I feel I know you well enough to call you friend" (3)? Because, though he is careful to explain that there is no avoiding "the fundamental differences in our respective worldviews" (3), he first explains how he is, at a human level, no different from the pastor:

> First of all, we grew up in the same faith. As a boy I too answered the al tar call; I went under the water. Although I no longer belong to that faith, I am confident that if we met and spoke privately of our deepest beliefs, it would be in a spirit of mutual respect and good will. I know we share many precepts of moral behavior. Perhaps it also matters that we are both Americans and, insofar as it might still affect civility and good manners, we are both Southerners. (3)

'You see?' he slyly intones, 'I'm just like you. We want the same things, after all.' He even goes so far as to offer a homily (yes, a homily) on biodiversity (89). Whether he has was been tempered by the teachings of NOMA or was simply never able to escape his own religious background, Wilson respects Protestantism, and is keenly aware that such an appeal, because it deals with religion from a scientific perspective, can only be effected among those in his own peer group, those with whom, even as a scientist, he can still be a 'good old boy.' Wilson has chosen to respect the religious 'authority' of the

South in large part because, though he does not agree with their false ontological views, recognizes that by the time everyone is converted to agnosticism, the planet will already be wrecked beyond recognition. The enemy of my enemy is my friend: better to work with your sometime opponents than fight them, especially when you are both facing the truly frightening prospect of the human holocaust of the natural world.

Even more curious, however, is the fact that Wilson has here chosen to uphold NOMA: in fact, his magisterical approach bears an uncanny resemblance to that of Stephen Jay Gould. Like Wilson, Gould believes that total reconciliation of the distinctly different worldviews embodied by science and religion is, at least for now, a useless, untenable act, and that conflict between the magisteria arises almost entirely by one side trying to overstep the bounds of another. Gould (and, I would argue, Wilson) "embraced the project of combining the truths of science with the interpretations of the humanities" because "he believed that in the right hands it illuminated rather than obscured" (Pringle 71), but resented the Wilsonian method of Baconian reductionism. In *Rocks of Ages: Science and Religion in the Fullness of Life* (1999), Gould takes this one step further, using NOMA to postulate that there need not be an attempt to divide and conquer, after all. According to Gould, the debate between science and religion "exists only in people's minds and social practices, not in the logic or proper utility of these entirely different, and equally vital, subjects" (3). Perhaps, being Jewish, he felt himself removed from the uglier reaches of the contemporary conflict between science and religion, and perceived no hypocrisy in describing himself as "an agnostic in the wise sense of T.H. Huxley.. .be

cause, truly, one cannot know" (9), words that are otherwise often harangued as being contrary to the profession--which is, perhaps, why Wilson makes such a point of denying the faith, even while buddying up with its leaders and using its rhetoric. Gould, on the other hand, does not "understand why the two enterprises should experience any conflict" (4), seeing, as he does, that the magisteria encompass entirely disparate realms of thought:

> Science tries to document the factual characters of the natural world, and to develop theories that coordinate and explain these facts. Religion, on the other hand, operates in the equally important, but utterly different, realm of human purposes, meanings, and values--subjects that the factual domain of science might illuminate, but never resolve. (4)

To infer, therefore, that representatives from either party could dictate anything about the magisteria of their counterparts would, he believes, be a dangerous fallacy, rendering the belief that "some grand intellectual structure will bring science and religion into unity, either by infusing nature with a knowable factuality of godliness, or by tooling up the logic of religion to an invincibility that will finally make atheism impossible" (4) a sorely deluded fantasy. But Gould wasn't entirely right about this: for one thing, science is superior to logic (one reason why we're no longer positivists), and no amount of rhetorical goose-stepping can ever prove the existence of a godhead. Further, the sciences are all about exploring human values: recall the example of the literature/psychology summit mentioned in my introduction. Plus, Gould was also adopting the historical conflation of religion and the humanities, when in fact modern humanism is not inherently religious (he may have written *The Hedgehog* as a means of clarifying this point). Further, Gould

was looking at the situation as a Manichean dichotomy, when it fact it is a godless (because there is, as yet [after thousands and thousands of years], no proof) continuum: he was correct in assuming that science and religion do not need to be brought into unity; he was wrong in believing they are deserving of equal consideration: for as Dawkins points out, the 'God hypothesis' is just one more debunked myth in the grand network of enquiry of scientific knowledge; both the physical and human sciences have replaced it as means of enquiry and discovery. Religion is simply--as Dennett, Dawkins and Sagan intimate--a noteworthy historical holdover, an increasingly rare vestigial organ containing the outdated tools upon which we, as humans, used to have to rely for our ontological enquiries. And so, as you might well imagine, this part of *Rocks* was not well received, especially by scientists (Dawkins and Dennett make a point of flipping it on its head in their own books). After all, their logic goes, the Amish still use iron implements to hew wood beams, but most of us recognize the good sense of building our log homes with rotary saws, steel hammers, drawknives, and power tools.

Gould, however, is quick to point out that not all Christian religion and 'moral' philosophy stands in opposition to science; the militant 'scientific' creationism often pointed to as the poster child of inter-magisterial warfare, for example, is simply "a distinctly American violation of NOMA" (125); outside of American Protestantism, the phenomenon is virtually unknown, so much so that skeptical French and Italian Jesuits once asked Gould to verify its existence (132). For Gould, then, "Creationists do not represent the magisterium of religion," and therefore "cannot be read, in any legitimate way, as an

episode in any supposedly general warfare between science and religion" (128). According to Gould, those "militant atheists [like Dawkins or Wilson] whose blinkered concept of religion grasps none of the subtlety or diversity, and equates this entire magisterium with the silly and superstitious beliefs of people who think they have seen a divinely crafted image of the Virgin in the drying patterns of morning dew on the plate-glass windows of some auto showroom in New Jersey" (69) need to take it down a notch, and back off a field that he believes is not theirs to evaluate. But NOMA purports to be more than a bunch of 'silly peacemakers' saying "'I'm OK, you're OK--so let's just avoid any talk about science and religion;'" it does "challenge certain particular (and popular) versions of religious belief...And...does forbid scientific entry into fields where many arrogant scientists love to walk, and yearn to control" (93). Gould's argument does tend to get a bit rhetorically sticky, of course: it's hard to see, for example, why scientific creationism violates NOMA, while the equally absurd concept of creative science ("the belief, for example, that God works through laws of evolution over the long time scale determined by ge ology, and that this style of superintendence may be regarded as a mode of creation" [126]), is allowed to "fall entirely within the spirit of NOMA" (127). But again, we must remember that Gould was an agnostic; although he could completely disprove creation scientists' theory that Earth was only 6,000 years old, and that modern fauna are the only animals to have ever existed on this Earth, he could not disprove the existence of God altogether. Though it may seem paradoxical, Gould was, in his mind, being scientifically rigorous. The ultimate validation of a scientific law is that it cannot be disproved (though

this tenet is traditionally traced to Popper, I seem to remember being versed in it as a girl, so it cannot be a totally 'extrinsic' 'humanistic' 'invention'); Gould thought he was only being logical when he posited that those claims he could cannot address, such as the personally held superstition of others, are outside the realm of science. Of course, not all scientists agree with him, including myself. Because science, though it accepts that religion arose as a human means of explaining nature and humanity--why are there so many species of animals? why are snakes poisonous? why do we get sick? what are stars? how does sex work?--with what limited tools then available, deals first with replicable proof, and when it comes to religion, there is none. Simply because the ultimate test of the sciences is not applicable to religion does not mean the overwhelming battery of scientific tests which demonstrate there is absolutely no proof to support religion are irrelevant. To believe this is to lend ammunition to 'faith-heads' claiming you can use the same post-modern logic to disprove the structure of the atom (has anyone ever *seen* an atom?) or the theory of evolution by natural selection (has anyone ever *seen* a living dinosaur?). Of course, science knows that atoms exist because we know their structure, and can predict, with absolute certainty, how they will react if we manipulate them, and that natural selection exists because we can capture it in microcosm. But as Dawkins pointed out, you can't disabuse a zealot, for he is not so open-minded as the Gouldian/Huxleyan agnostic, and certainly won't repay the favor. So why bother humoring him? Dawkins, of course, is also fond of pointing out that Gould's type of 'don't ask, don't tell' agnosticism, because it was rigidly cemented to the NOMA ideal, was, in fact, a manifestation of PAP,

Permanent Agnosticism in Principle, a philosophy more credo than method, in which 'the God question' exists on another plane entirely, like those other subjective brain teasers (do you and I see the same red, etc). The thing is, nowadays, we can answer questions like these with science (counting rod and cone cells, systematic elimination of the color spectrum [as when red disappears in a submarine]), etc), but for a long time, we couldn't, simply because we, as humans, did not yet possess the tools to unravel them. And so, as Dawkins correctly points out, there is only one kind of scientific viewpoint: Temporary Agnosticism in Practice, or TAP. It means that until we can definitively answer a question with science, it's ok to sit on the fence and play Brain Teaser and Devil's Advocat. It does not mean that religion is entitled to a rationally bankrupt, Hammerian, "Can't touch this" defense. (Oh, and by the way, it was an egg, it just wasn't laid by a fully contemporary chicken.)

Unfortunately, however, this 'conflict' is itself indicative of another force at work: the perpetual, time-honored bugbear of politics. Knowledge is power, after all, and whichever 'approach' (which religion is not, but is popularly conceived to be) controls the path to Truth will secure funding for its purposes (in the short term) and enjoy popular support and longevity (in the long run). Thus, one of the factors that undoubtedly spurred Gould to write *Rocks of Ages* was the frightening rise of 'scientific' creationism, a clear threat to the magisterium of science, as it poaches scientific territory and "tries to impose its irrelevant and illegitimate will upon the other's domain" (126), spinning scientific tenets as being explainable by (and thus subservient to) the field of theology; it's Wilson's

sociobiological safari turned back against itself. This is understandably horrifying: imagine the consequences if theology was allowed to explain all facets of human behavior, mental functioning, and ecology (oh, wait...). If, on the other hand, theology can be explained away (reduced) by science--as Wilson proposes in *Consilience*--or is smiled upon as a harmless vestige--as in Gould's version of God working through scientific laws--it is effectively defanged, and cannot compete with science for funding or political consideration. For Gould himself admits that "we must pursue a primarily political struggle" (69) in order to convince both religious and scientific 'extremists' of the validity of NOMA.

One way he attempts this is to argue that there is no conflict between science and religion at all. When he tells us that creationism represents a minor, fanatical faction of an otherwise reconciled religious establishment, that no one really laughed at Columbus for thinking the Earth was round (114), and that Galileo was "an immense hothead" anyway (74), Gould is really convincing us that science was never sweating it in the first place; after all, "you can't have a war when one side declines to show up" (115), nor when one side generously deigns to pardon its classical adversary and absolve it from the popular charge of dogmatic villainy. Gould is telling us that science doesn't regard religion as a real threat (and, globally speaking, it doesn't); that if there were any genuine concern on the part of science, Gould's narrative would probably have read very differently. Of course, his attempt to paint science as the 'bigger man' does obscure a rhetorical motive: after all, the above statement implies, wouldn't you rather side with the placid, unconcerned giant embodied by science than the dozens of unallied theological

ankle-biters engaged in a futile attempt to bring him to his knees? But still, it's arguable that if scientists like Dawkins really didn't care at all, that if they were entirely assured of the place of science as permanent *primum mobile* of intellectual endeavor, they wouldn't be keeping one eye open at night for those crafty, crafty Lilliputians (particularly the creation 'scientists').

However, given the current politicoacademic climate, it is clear most people come down on the side of Gulliver: President Obama ran on a platform consisting largely of student aid, scientific education, and exploration untrammeled by religious conservatism. The hard sciences, too, as the (for the most part, correctly) perceived means of abating our ecological and economic crises, enjoys such a high status in the academy that its practitioners have no need of defending their territory; they receive unparalleled funding and enrollment. Theology, on the other hand, with its considerably smaller grant pool and slackening subscription list, can easily get the feeling that it needs to watch its collective back (or maybe not, since they don't seem to pay much attention to modern life, anyway). Of course, it's important to note that scientists aren't concerned with direct attacks--globally, the sciences are far too strong for theology to make even a dent in the foreseeable future--Stateside, however, we worry about their perception in the eyes of religiously-educated youth, whose progeny, if they choose to remain opposed to science, may one day become politicians responsible for proposing unconstitutional laws depriving further children of a comprehensively scientific education (don't forget my real definition), which, in turn, could potentially produce more uneducated folks like themselves,

thereby depriving organized science of enterprising young minds. It may seem, of course, that I am engaging in an abject rant for personal, subjective reasons. This is only half correct. My own experience as a pupil in an American Catholic school (which took place before some of the Vatican's more important repositions on scientific issues) was utterly devoid of a scientific curricula. There was no science (although you allegedly got some chemistry and Shakespeare in middle school, but by then, it was too late for most to have an interest in it, and my family had moved [thank goodness]). Scientific learning was, quite simply, never discussed. Now, me being me, and with my mother just happening to take anatomy classes at the local college, my Catholic 'education' had no effect at all. But it completely broke some of my less rebellious, less well-exposed, colleagues. While I took every chance to subversively incorporate science into my work (my favorite piece was an open research report about, interestingly enough--and, as some readers will no doubt argue, allegorically enough--the evolutionary history of the African Wild Ass, *Equus africanus asinus*), many of my peers were forever disabused from the 'habit' of being curious about the natural world, probably forever. They would not go on to scientific careers (physical or human) because, as Dawkins points out in *The God Delusion*, they didn't know they could. Why is this so urgent? Because, in some states, our nation's children are still actively being frightened away by the religious establishment.

There is a good reason for parents to worry about the education of their children. Elementary and preschool education is more than critical for the encouragement and cultivation of a well-rounded intellect. And the sciences, though they are imperfect, really

are a key means of fostering rationalized democracy as well as a sense of youth empowerment, because they introduce the learner to universal, rather than local, perspectives. They force us to perceive our continuities and appreciate our differences. On the other hand, I know from experience that, quite often, a child's interest in the sciences (and not just the physical ones) is squelched by religious dogma, all because their teachers, parents, or mentors (people they trust) tell them it challenges the 'sacred' explanation for how the world works (even modern Catholic schools, which do teach evolution, preface such studies with a firm 'well, yeah, um...you really don't have to believe this.' Also, in impoverished parts of the American South, you either receive a religion-based education, or none at all). And so their educations--and therefore their futures--are being threatened; in a very real way, then, the sciences are under siege here in America, in a way that they are not in most other world nations. The eventual result? Ignorant people (*cough* *Republicans*). Theirs is a dogma which, when it elects a president (*cough* *Bush*) who adheres blindly to the same beliefs, results only in bloodshed, irresponsible economic in vestment, racist monetary allocation (never forget how many people died in lazy, senselessly disorganized post-Katrina rescue operations), and the perpetuation of squalid igno rance, all in the name of a Christian god and its nonsensical value-system. In addition, if our neglect of science is allowed to keep up, foreign minds will continue to unilaterally staff our graduate departments and universities in the physical sciences, intrepidly achieving wonderful scientific and technological innovations, only to return to their native countries, taking their educational discoveries with them and leaving the United States,

effectively, in their socioeconomic dust. The chemistry department at Tulane, as I recall, was primarily composed of Chinese and Russian citizens on study visas; nice folks, all, who deserve the opportunity to study in any country they choose, but that's beside the point: I am arguing that more Americans need to join their international colleagues and earn more graduate degrees in science. (Do not mistake my sense of national urgency for bigotry: regardless of where you, your parents, or your grandparents were born, if you hold American citizenship, you are an American.) The alternative is, of course, wide-spread economic and intellectual pauperization. Such is the ideological risk, and the real national danger, of uncritically permitting the existence of a set of parasitic dogmas that, once inculcated, steadfastly refuse to allow their hosts to be educated and pursue an inter-est in the open-minded, embracive, universally human sciences.

CHAPTER 7

"IT'S JUST A JUMP TO THE LEFT" : ON THE BENEFITS OF BEING AN ACADEMIC TRANSVESTITE

"Don't get strung out by the way I look
Don't judge a book by its cover
I'm not much of a man by the light of day
But by night I'm one *hell* of a lover.
I'm just a sweet transvestite from Transexual, Transylvania."
-Dr. Frank-N-Furter, *The Rocky Horror Picture Show*

"Well I don't exactly know what's going on in the world today, don't know what there is to say about the way people are treating each other--not like brothers; leaders take us far away from ecology with mythology and astrology, just can't find the words to say about the way we live today; why can't we learn to love each other, try to learn the new faith to the whole worldwide human race, stop the money chase, lay back, relax, get back on the human track; stop chasing on oblivion oh such a sad sad state we're in, and that's the thing, do you recognize the bell of truth when you hear it ring? won't you stop and listen to the children singing? won't you sing it children? won't you come on and sing it, children?"
-Leon Russell, "Stranger in a Strange Land"

So where are we going with this? It may tempting to pull a Foucault, exploring a massive dilemma and providing no viable solution (all in service, of course, of 'proving' that such a solution cannot exist). But I, like Gould, am an optimist, and will attempt a brief overview of one strategy that might help scientists and humanists come to terms without attacking one another like the Aliens and Predators they currently are. Because, like kids on a hopscotch blacktop, if we are to be consilient, somebody has to jump first; someone has to take that first step to the right in their pedagogy. We just have to make sure that when that party jumps, it's not off a cliff, leaving the other party snickering on the brink. How, then, do we achieve true, mutually recognizable interdisciplinarity? How

do we learn how to become capable of slipping between disciplines and paradigms with consummate ease? The answer is frighteningly simple: education.

And I believe most of you will agree when I say it's high time some of us changed our clothes. (Seriously, guys--they're getting pretty ripe.) As Connie Missimer points out, mine is a rhetoric of potential. Best of all, this potential conveys playful incentive, rather than painful sacrifice. In order to achieve reconciliation between the human and physical sciences, university students need to complete coursework in both disciplines. It is important, at this early stage, to announce that I do not intend for all students to assume the same curriculum: this is tantamount to the mind-numbing restrictives of *No Child Left Behind*. But I do believe that it is necessary for students of the physical sciences to be well versed in the studies of their humanistic counterparts, as well as for scholars in the human sciences to be comfortable with the work of their more physically-minded brethren. NOMA is well and good (not to mention respectful), but remaining willfully ignorant of each other's inner workings while sniping each other across the battlefield is a recipe for disaster. NOMA may *seem* to be the only respectful, confrontation-avoiding solution (being, as it was, proposed by a great man with a good heart), but ultimately, it is as worthless as Jim Crow-era segregation, in which students were written off as being 'separate but equal.' Clearly, better understanding is necessary. Here is the situation as it stands:

Most high schools require students to take courses in the physical and biological sciences, including chemistry, anatomy, astronomy, and physics. At the university level,

however, students pursuing a degree in the humanities are often required to take only one course in chemistry or biology. Conversely, students in the sciences get by with only one introductory writing course, coupled, perhaps, with one class in the social sciences. In both cases, students of either persuasion only interact professionally once or twice during freshman year, before diverging from one another for the next three. Typically, they meet only once more: at senior convocation. The result: among cross-'cultural' friends, the discussion of one's subject matter is more taboo than sex, politics, or religion. Truly, it is a sad state of affairs when I can state that my high school education, which took place in quite possibly the meanest of xenophobic Wyoming towns (where the math teacher slept with the basketball players, the agriculture instructor molested unwary freshmen, and the diner refused to serve black people [though its biology instructor was nothing less than an inspired gem of a teacher]) was more interdisciplinarily open-minded than many a formalist professor I've had the pleasure **cough** of knowing (conversely, if there's one good thing about the rhetoricians I've known, it's that they usually break the mold). I suggest that such segregation is harmful, and works at cross-purposes to the ethos of the modern university. Students, then, should be required or encouraged to take three or more courses 'across the divide,' allowing them to delve beyond the superficial, introductory experience of 'the other' now fostered by many college policies. Nor do I intend to let policymakers get away with half measures: those courses for students outside the major (like 'science for non-scientists') are really an insult to the intelligence of our youth: students need to be immersed in a subject, rather than treated with kid gloves. Of course,

students should be given the freedom to follow their interests outside the discipline; some, of course, will prefer paleontology to Newtonian physics, while others might prefer geology or entomology. Likewise, scientists might enjoy environmental literature or the history of paleontology (or James, or Poe, or postmodern theory). More important than the subject matter, however, is the sense of community such cross-pollination would engender: imagine scientists feeling comfortable in the strongholds of the humanities, able to hold a steady discourse about literary tropes and psychoanalysis; imagine humanists able to converse intelligently about r-factors and margins of error, able to put those skills to use in laboratory courses or the analysis of scientific data. How about a mandatory minor in the human sciences to go along with that major in the physical one, and vice versa?

Opponents will argue that, at best, such policies are pointless; at worst, potentially disruptive, resulting in over-enrollment and inane conversations that prevent the 'natives' from progressing in their studies. The truth is, however, students are more curious about each other's disciplines than they are willing to admit, and to argue against these things indicates a fundamental underestimation of the intelligence of the 'strangers' across the quad; one major cause of the supposed 'conflict' between the disciplines is the sheltered, naive belief that no one outside one's own field is capable of understanding the sacred mysteries one holds dear. This is far from reality; part of what makes one a real, dyed-in-the-wool scholar is the drive to continue learning, and the mental flexibility to approach it. This holds true regardless of subject matter, and enables us to interpret subjects about

which we have little experience, allowing us to don the vestments of an otherwise 'Alien' culture.

Consider the following case: a doctor, well versed in the physical sciences, is utterly incapable of communicating with his patient. Rather than bothering to explain to him the medical and psychological bases for his condition, the doctor simply writes out a prescription, mentions possible side-effects, and exits the consultation. The patient, because he does not know how the chemicals will interact with his body, is all but forced to take the doctor's scientific word on faith, and is utterly bewildered when the medication fails to achieve its target objective. I would argue that, had this doctor but taken a course or two in communication studies, his conduct would have been vastly altered: he would have known, as communications majors do, that explaining the basics of the biochemical changes he was administering to his patient would allow for greater understanding on the part of the patient, which would allow for rational decision-making rather than abstract 'faith' in medicine (for example, if an addictive medication is being proposed to combat a chemical addiction, the patient, realizing that, should be able to request another plan of action). Sound far-fetched? Not at all. The Lyman Briggs College at Michigan State University has been providing "a science education that is grounded in the liberal arts" since 1965. Among their stated goals is an interdisciplinary merger designed "to bridge the cultures of the natural and physical sciences with the cultures of the social sciences and humanities." The college offers significant freedom in terms of the human science courses students are allowed to take, but it does require them to take at least four classes

(including a capstone seminar) in the history, philosophy, and sociology of science, particularly as it relates to the larger world in the areas of technology, environment, and medicine. Their curriculum is widely hailed as producing excellent scientists, because it connects students to problems and ideas that, at least initially, seem to occur outside their own purview.

Once we've begun to understand one another on our own terms, we can begin the long process of true conciliation, particularly as publishable texts available on the open market. Too long has popular science writing been interpreted as a message of *scientia vincit omnia,* aimed at an audience of 'smug' scientists and 'enraged' humanists, written off in Marxist political tracts as unequivocally declaring that 'the place of the humanities is at the left foot of science.' Why should this continue when Gould has clearly shown us this is not the case, that by traveling in the intellectually diverse and embracing footsteps of Montaigne, hailed as a progenitor of the philosophies of *both* modern physical science and modern humanities, we may accept the majesty and mystery of both these fields? Montaigne, who, as a pillar of both the scientific and humanistic institutions, offers us a diverse, non-monolithic (multi-lithic?), fully approachable methodology devoted to the advancement and dissemination of human knowledge, rather than cliquish, arcane exclusivity. Under such a model, learning becomes desirable for its own sake, rather than a routine stock-and-trade activity, a series of hurdles over which one must leap to reach a degree. Scholars within and without their departments are able to comment critically upon their work, transcending entrenched academic boundaries. On the other hand, it is

clear we can no longer accept the popular perception of the physical sciences as consisting only of the savage, ruthless elimination of all but a singular path to understanding; this sort of colonizing leads only to latent (sometimes not-so-latent) conflict between disciplines, with hurt feelings on all sides. True, human artforms like abstract poetry and film may the result of genetic 'accidents' or a new form of primate intelligence than cannot (yet) be explained or examined in the terminology of the sciences; but this does not mean that they should be discarded as useless meat by-products unworthy of serious, illuminative study with the other tools in our collective intelligence, or that their scholars should be negated as 'unscientific' Luddites. Such animosity is ultimately destructive, even for science; if the sciences were really about finding a flawless Platonic truth on some great chain of intellectual being, even the other, 'softer' hard sciences would eventually be thrown out as irrelevant. The intellectual center would then collapse under its own weight, forming a black hole from which no system of subjective human knowledge could escape. Where once a mighty academic edifice stood, only a void would stand.

Given the risks inherent in believing knowledge to be a purely, unilaterally positivist, reductionistic process, it seems strange that those directly threatened by its unimpeded advance have refused to write consilient texts of their own, exploring how the tenets of humanism might be related to the principles of science. The time for appreciating the intellectual for his own sake has passed: sadly, in a time of economic hardship and lucrative global economics, all institutions will be judged on the scale of their monetary bottom line. Whether empirical or humanistic, our learning must be *practical* (don't mis

understand me: even creative writing is practical from a productive standpoint). Human scientists can no longer hide their heads in the sand, pretending that consilience is a scientific construct inapplicable in their own profession--consider what happens when, for example, scientific writing is deemed more practical and economical (for students who will likely enter a burgeoning scientific job market are far more prevalent than budding humanists) than traditional, more humanistic forms: instructors and directors of writing programs will be forced to adapt scientific principles or go extinct. What happens when history is considered irrelevant in the face of modern technological and medical development? What happens when sociology and literature, because they refuse to adopt their own empiricism, are dumped in favor of human primate behavioral studies? If these fields do not recognize that their inquiries represents trials of a singularly human way of knowing, if they cannot vocalize the very real ways in which they, too, contribute to human progress and self-understanding (especially to non-specialists), I fear they will suffer for it.

Unfortunately, such a fate seems likely in a world where, already, the vast majority of students in freshman writing classes at public universities are destined for careers in math and science. Students in the humanities, whose degrees have, in the past century, been given the epithet ‘useless’ (especially literature and history), are becoming scarcer and scarcer. And, in fact, students of these fields will be the first to tell you that theirs is a degree ‘all but useless’ outside the narrow confines of the sheltered academy. Such stark realities have frightened many nascent humanists away from these fields, and, as

their departmental enrollment has fallen, so have their funding and professional salaries, which are shunted off to rapidly expanding biology, agriculture, physics, and engineering departments. Masters and doctoral programs in English have been cut even at well-funded private universities like Tulane, which has diverted most of its cash to expanding its lauded, highly profitable chemistry and medical programs. To avoid becoming functionally obsolete, then, humanists must determine their own routes to consilience, and try to meet open-minded Gouldian scientists in the middle. This self-preservation can only be achieved through constant, concerted rhetorical exploration of how science and the humanities already do work together as scientific brethren; but unless books from the humanist camp offering real, palpable solutions to the negative intellectual stereotypes affecting us all arise from one camp for consideration by both, the silence of the 'weaker' sciences will be taken as defeat, and our strongholds will be razed.

Which means we have to get our hands dirty: complete a transect or wildlife survey, conduct a lab experiment, crunch raw data, reach scientific conclusions, write scientific papers. The call is an old one, but still it rings true. Read Plato. Read Twain. Read Khayyam. Read *Discipline and Punish.* Read *The Interpretation of Dreams.* Read what has been written about them, and write about them in turn. So get up, walk outside, cross the quad, visit us in our offices or --even better--in the library or out in the field. Promote such hybridization, as does Missimmer, through the funding of cross-disciplinary research assistantships and colloquia. Scholars love scholastic chitchat: odds are we'll both be more than willing to stop, explain our study, to show each other how it's done.

Scientists: attend some humanistic lectures, see for yourself the very real and constantly shifting stakes in play in the literary world (odds are you will recognize some similar politics afoot in your field apace), instead of scoffing at their 'subjective academic bullshit.' Humanists: get out here and *do* something with us, instead of simply griping or dismissing our more accurate methods as 'only one way of knowing' behind our backs. See for yourself why the task of the rhetoric of science should be to popularize science and make it accessible to the public (especially the human sciences) and give up your vain attempts to hamstring our (I mean this inclusively) collective primacy and importance. Remember: *don't try to describe the scenery if you've never seen it.*

It has not escaped our notice that the specific pairing we have postulated immediately suggests radical changes in the university writing program. We must follow Carolyn Miller's lead in explaining that technical communication is not the academic antichrist it is often made out to be; neither is straying from the domineering, authoritative passive voice. As she points out in her seminal 1979 article "A Humanistic Rationale for Technical Writing," professors of literature are often reluctant to permit technical writing as an English requirement because they believe it to be devoid of 'humanistic' content (translation: they're sore over falling enrollment in their classes), a proposition that, Miller confirms, utterly baffles composition scholars, who, because of their more disciplinarily inclusive training, are fully aware that 'objective' models of science have, in most youthful circles, long since fallen by the wayside. We must, like Davida Charney, realize that "empiricism is not a four-letter word." We must also realize that technical

writing is not the same as more-narrowly defined scientific journal writing. Further, we must introduce students to the great masters of all these techniques; verse them in multiple styles in order to create a hybrid confluence between them--let the students judge for themselves what works and what doesn't (for once). We can do this when we teach freshman writing by incorporating 'scientific' essays into our curriculum, and pairing them with appropriate 'humanistic' pieces. We must *hybridize* our curricula in order to strengthen student resistance to academic bigotry and anti-intellectualism. In our professional societies as well as our classrooms, we must work to demolish the paper walls between us by actively seeking the unification of a single citation and formatting style. We must *show* our students that there is no great divide between the efforts of scientific and humanistic thought. It *will* be worth it. But, in the wise words of Lamar Burton, don't take my word for it: go out there and try it for yourself. For as even academic scholars know: experience is the best instructor of all.

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