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Chapter Author(s): JASON BELL and FRANK PAVIA

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PART I

VARIATIONS AND METHODS



Time Bomb

Pessimistic Approaches to Climate Change Studies

JASON BELL AND FRANK PAVIA

Nuclear Testing and Oceanography

FRANK PAVIA: I'm an oceanographer but I've never seen below the top five meters of the ocean. I've never seen the ocean. I've been on boats that have traveled across the ocean, collecting samples from the bottom of the ocean, and I've never experienced or seen below the surface.

JASON BELL: You've never seen the thing that you use as your index or marker, either.

FP: No, I've never seen an isotope of protactinium. I've seen a solution that has protactinium in it, but the only way that I know it has protactinium in it is by measuring the protactinium atoms.

JB: As a literary critic, I don't even know if I'm asking the right question. We've spent so much time listening to the Clash and watching movies from the 1970s and thinking about how humans have represented their attempt to represent the ocean, so I feel like asking, "what does surf punk tell us about bomb radiocarbon and radioisotopes?" But we don't really want to be asking that question.

FP: That's a pointless question because it leads us to a predetermined outcome.

JB: Let me start then by asking whether you learned anything about oceanography from the process of writing this paper, not just from listening to surf punk or watching *Apocalypse Now*.

FP: I'm not sure how much I learned about oceanography, but I learned a lot about literary criticism and surf punk music and Francis Ford Coppola. I don't find that concerning in any way. I take it that you learned a fair amount about oceanography?

JB: I feel like I know more than the average person does.

FP: I hope you do.

JB: Aside from intellectual enrichment, what's the point of this kind of work? Or is there no point? There's no point.

FP: I find it encouraging.¹

Radiocarbon (^{14}C), a rare, radioactive isotope of carbon with a half-life of approximately 5700 years, is formed naturally in the atmosphere by cosmic ray interactions with nitrogen. Under normal circumstances, neutrons generated by cosmic rays bombard nitrogen atoms in the atmosphere, converting them to radiocarbon by forcing the most common isotope of nitrogen (^{14}N) to emit a proton.² The natural budget of ^{14}C in the atmosphere is controlled by changes in solar activity, Earth's geomagnetic field, and exchange with carbon pools of the terrestrial biosphere and ocean.³

Human activity has disturbed the natural balance of radiocarbon, most notably through aboveground nuclear testing. Nuclear weapons are made possible by chain reactions, wherein the production of one neutron perpetuates a loop of neutron production. As a result, atmospheric nuclear testing releases enormous external fluxes of neutrons into the stratosphere. Nearly all of the neutrons generated by nuclear weapons tests react with atmospheric ^{14}N to form ^{14}C far in excess of what is produced naturally by cosmic rays.⁴

The Trinity test in 1945 marked the first detonation of a nuclear weapon. Less than a month later, the United States dropped atomic bombs over the Japanese cities of Hiroshima and Nagasaki. For the next eighteen years, more than five hundred aboveground nuclear tests were conducted before the United States, USSR, and United Kingdom signed the Limited Test Ban Treaty (1963), banning aboveground, underwater, and outer space nuclear testing. The motivations for the Limited Test Ban Treaty (LTBT) were manifold, but were focused by concerns about the dispersal and human health hazards of radioactive fallout.⁵

The effect of nuclear testing is evident in records of ^{14}C measured in ground-level air over time. Between the onset of measurements in 1955 and the LTBT in 1963, atmospheric $^{14}\text{C}/^{12}\text{C}$ ratios increased tenfold over pre-nuclear values. In particular, a massive spike in atmospheric $^{14}\text{C}/^{12}\text{C}$ was observed in 1963, corresponding to the final

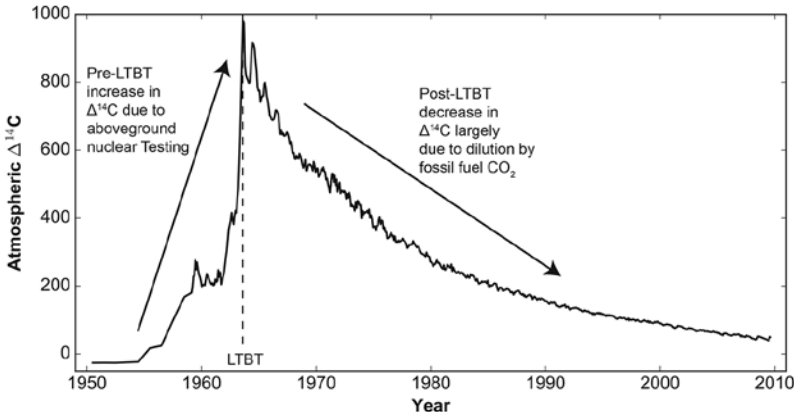


FIGURE 1.1. Northern Hemisphere atmospheric radiocarbon contents 1950–2010 in delta notation (where $\Delta^{14}\text{C}$ refers to the $^{14}\text{C}/^{12}\text{C}$ ratio of CO_2 relative to a standard, corrected for age and isotopic fractionation).⁶ The dashed line in 1963 demarcates the signing of the Limited Test Ban Treaty (LTBT). The pre-LTBT increase in atmospheric $\Delta^{14}\text{C}$ is due to production from aboveground nuclear testing. The post-LTBT decline is primarily due to dilution by radiocarbon-free fossil fuel CO_2 emissions, but also partly by atmospheric exchange with the oceans and terrestrial biosphere.

burst of aboveground tests before the LTBT was signed (Figure 1.1). In 1983, Reidar Nydal, one of the first scientists who sought to measure bomb-produced ^{14}C , wrote regarding his motivations, “like most people 20–30 years ago we were worrying about the possible danger to human health from the enormous nuclear activity in the atmosphere.” But Nydal and his colleagues also “realized that the radioactive isotopes already injected to the atmosphere could be useful tracers in geophysical research.”⁷

The 1963 ^{14}C peak tagged and time-stamped the atmosphere. By measuring ^{14}C in plants and ocean waters, scientists could track how long it took the bomb spike of ^{14}C from 1963 to enter different reservoirs within the Earth system.⁸ The timescales of Earth’s carbon cycle could now be established. It became possible to calculate how fast carbon could pass from the atmosphere into land plants and the ocean over periods of years to decades.

Two findings using bomb ^{14}C stand out as particularly important for understanding how the Earth will naturally respond to and partially mitigate anthropogenic climate change. By measuring inventories of bomb ^{14}C in the ocean, Stuiver was able to calculate the rate of gas exchange between atmospheric CO_2 and the ocean.⁹ Twelve years

later, Siegenthaler and Joos tuned a numerical model of ocean physics to reproduce the spatial distributions of both natural and bomb-produced ^{14}C .¹⁰ Their study solved for mixing rates at different depths in the ocean and the transport rate of carbon from the ocean surface to the interior. The first study determined how fast the ocean can absorb CO_2 from the atmosphere; the second determined how fast the ocean could sequester that CO_2 at depth. Together, these two studies make up the foundation upon which scientists are able to predict the removal rate of fossil fuel CO_2 on both human (years to decades) and geologic (thousands of years) timescales, the basis for modeling projections of future climate change due to greenhouse forcing.

Cultural critics and Earth scientists alike frequently cite climate change as a unique emergency in the preservation of life and the classification of knowledge.¹¹ Anthropogenic climate change threatens to dissolve a barrier separating histories of the human species and culture from the natural world. Both conservative and alarmist models project such dramatic modifications to the Earth system that the reorganization of human civilization and nonhuman ecosystems over the next millennium seem inevitable.¹² Mass migration and catastrophic biodiversity loss are forecast over this extended period of time.¹³ The likelihood is remote that humans will avert permanent changes to the Earth system or know in advance what those changes will be. Sea level rise, the spread of tropical diseases, and animal and plant extinctions may be unavoidable except through technological fixes (launching sulfur dioxide into the atmosphere, carbon sequestration), side effects unknown, or a revolution in the global energy economy.¹⁴ Even if geoengineering or a total restructuring of petrocapitalism could have been implemented before 2020, the climate change already incurred may be irreversible.¹⁵ Yet the principal response to climate change in the academy is a call for new alliances and collaborations between scientists and humanists to produce social transformation and technological solutions.¹⁶

To make matters worse, the difficulty of predicting medium- and long-term futures, along with the unimaginably enduring presence of greenhouse gases in the atmosphere, pose a serious dilemma for communicating the urgency of climate change to the public and conducting research on its effects. In order to explain why climate change matters and how we might begin to develop new interdisciplinary

paradigms to conceptualize its likely impacts, scholars have advanced a new geologic epoch. As opposed to epochs like the Pleistocene or Holocene, the Anthropocene is marked by human activity, not geologic phenomena like the waxing and waning of ice sheets. Instead of atmospheric warming associated with industrialization, recent recommendations peg the onset of the Anthropocene to the release of nuclear fallout in the 1950s.¹⁷ Therefore, as an index and symptom of the Earth's response to human technology, bomb radiocarbon anchors oceanographic and historical work on anthropogenic climate change and crystallizes its central problem: how to coordinate work at extreme timescales distended far beyond human lifespans in disciplines that hold different methodological norms? To rephrase that problem in this essay's terms, how can an oceanographer (Frankie) and a literary critic (Jason) collaborate without begging the question that such research is possible? If our premises hold—that the harms of climate change are unavoidable, and that the timescales of climate change and radiocarbon indexes exceed generational experience—we need interdisciplinary formations with lower confidence in and less emphasis on research outcomes.

In this essay, we invoke a line of pessimistic philosophy to explore a mode of interdisciplinary work that does not insist on the predetermined value of research outcomes or the active generation of knowledge. Extending from Voltaire through Schopenhauer, Nietzsche, and the early twentieth-century existentialists, this pessimistic tendency gravitates toward a reality constructed through unsatisfied desire and suffering, roughly speaking. Although epistemic pessimism is underdeveloped in comparison to this metaphysical and ethical articulation (the world is bad and getting worse), one can hold a pessimistic attitude toward the production of knowledge, its verifiability, communicability, or stability. Our objective, described in greater detail below, was to study the relationship between nuclear testing and anthropogenic warming from scientific and humanistic perspectives simultaneously. This task underscores the problem of epistemic pessimism that lurks behind scholarly collaboration. The coauthors each brought an object—bomb radiocarbon and surf punk music—to the table. Without making historicist, formalist, or scientific claims about the relationship of the former to the latter, we engaged in what we call “interdisciplinary pessimism.” Collaborative talk, reproduced

throughout the essay in dialogic asides, is both the method and outcome of our disciplinary work. These dialogues represent a form of companionability catalyzed or initiated by grief or panic. Our conversations organize what we call a passive counterculture, or oppositional attitude toward the dominant relationships linking scientists and humanists in climate studies. By conversing without hope of an instrumental outcome, we identified analogous kinds of inactivity in an unlikely place: surf punk music. The insights that follow are not valueless but rather value indeterminate. Whatever use they might have for scholars, administrators, or policymakers is entirely open-ended.

Our experimental technique does not promise success, and may in fact look like a failure to those invested in optimistic (outcome-dependent) interdisciplinarity.¹⁸ What would success even look like under such a framework? In keeping with our method, we do not offer a conclusive answer. For us, success meant the choice to think together instead of separately, as we do on a typical day in the laboratory or library. That simple decision allowed us to explore mutually unfamiliar territory across disciplines and to take anything we found as a legitimate result. We hope to make the case for a greater diversity in interdisciplinary styles, especially when considering massive timescale phenomena like radioactive decay and climate change.

Negotiating and distributing the labor of climate change studies between disciplines like oceanography and literary criticism requires, first, a theory of what divides scientific from humanistic disciplines and, second, a theory of whether and how that division might be surmounted. Our first principle is that the sciences and the humanities are concerned with a shared collection of stuff (to use a technical term) like oceans, atmospheres, neurotransmitters, computational networks, books, characters in books, cultures, conflicts, and love. The common sphere of reality to which scientists and humanists direct their attention is prior to but accessed by observation and not apportioned into separate, inquiry-dependent domains. This is not an uncontroversial position because it is susceptible to reductive accounts of realism (described in the next section) and because it forecloses models of research based on alternative ontological preconditions; for example, pure ideality, which might structure the division of disciplinary labor differently. These different ontologies are at the

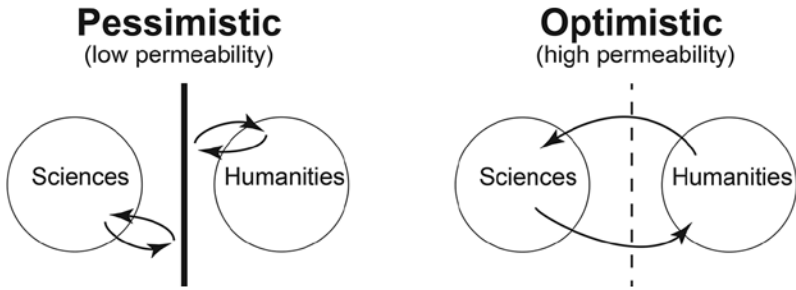


FIGURE 1.2. Schematic of interdisciplinarity as permeability.

margins of contemporary debates over climate change studies and beyond the scope of this paper with the exception of ontological pluralism, a position advanced in a series of recent papers by Jonathan Kramnick and Anahid Nersessian to discredit interdisciplinarity that subordinate humanistic to scientific explanation.¹⁹ Ontological pluralism posits that each discipline studies a bounded part of the world to which its particular mode of explanation is suited. Close reading belongs to poems, isotopic analysis to ocean currents. But we contend that if reality appears to be carved up into niches appropriate to each discipline—Ishmael in *Moby-Dick* for literary scholars, the Pacific Ocean and its currents for oceanographers—this partition of the world follows from the particular techniques, strategies, norms, and methodologies of knowledge production constitutive of each discipline. Specifically, we distinguish between types of *falsifiable* scientific explanation, capable of being proven false through experiment, and types of *nonfalsifiable* humanistic interpretation that, while susceptible to judgments of taste (one interpretation being more interesting or penetrating or astute than another), can only be proven comparatively plausible.²⁰ While literary criticism does not make novels and oceanography does not make oceans, the semblance of bounded subject matter for each discipline is an epiphenomenon of this boundary in epistemology. In contrast to Kramnick and Nersessian's claim that the kernel of both scientific and humanistic inquiry is explanation, we draw a sharp distinction between scientific and humanistic epistemologies, broadly construed.

At the risk of simplification—a risk we will have to accept on account of brevity—this essay assumes that not so much has changed

since C. P. Snow described the sciences and humanities in a 1959 lecture as two cultures with “literary intellectuals 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.”²¹ Snow might have found it strange, then, to encounter a paper coauthored by a literary critic and an oceanographer, both young, neither hostile nor completely incomprehensible to one another. Almost sixty years after *The Two Cultures*, research projects bridging the sciences and humanities seem various and robust, especially in fields like evolutionary and cognitive studies where the evident object of scientific study is the human mind or climate change studies where the object of study threatens to transform human existence. Nevertheless, Snow would be gratified to discover his original problem no less intractable: even when looking at the same thing from acute angles, scientists and humanists seem to produce different kinds of knowledge differently. Interdisciplinarity, then, is not an issue of adapting different methods to different subjects or topics, but rather the process of translating different kinds of knowledge about the same stuff from one discipline to another. The relative ease of translation or transmission across the membranes holding disciplines apart could thus be defined, to borrow from physical science, in terms of permeability. After describing available types of interdisciplinary research conducted under high-permeability conditions, we turn to a low-permeability state. We briefly explore one type of interdisciplinary pessimism, making small talk, in relation to bomb radiocarbon and surf punk and address a major criticism of this approach, its apparent absurdity.

Interdisciplinary Optimism

FP: In science, there’s a general feeling that people should publish negative results more often. If you do an experiment, and you find your experiment didn’t work, most of the time you don’t write it up because you have a failed experiment. But it’s likely that someone else is going to try the same thing, so if you don’t publish, you’re indirectly causing someone else to waste their time. You’re actually impeding progress by not exposing your failures to the world.

JB: Interdisciplinary optimism is so focused on being successful that there's no room to fail. There's a real risk that what we're saying about bomb radiocarbon and surf punk, or trying to say, is a failure.

FP: We have no idea whether this paper will work. I hope it doesn't.

JB: Which is in the spirit of the paper.

Most collaborative research between the sciences and humanities is predicated on the smooth transfer of method and knowledge across a line drawn in the disciplinary sand, as well as a belief that collaboration produces insights comprehensible and useable in both disciplines. Optimism's stranglehold is unsurprising, since the alternative (the impossibility or unlikelihood of transmission, the futility of the result) seems to provide little reason at all to be interdisciplinary. Further, the prevailing justifications for interdisciplinary work, including the rescue of the humanities from institutional belt-tightening, improved ethics of scientific experimentation and communication to the public, and the intrinsically interdisciplinary nature of emergencies threatening human existence (like climate change and artificial intelligence), presuppose an optimistic attitude.²² What would interdisciplinary work contribute to the study of climate change if not solutions, or at the very least, the promise of progress towards solvency? In this section, we classify the forms of interdisciplinary optimism that account for the majority of ongoing research and evaluate their efficacy.

From the perspective of the humanities, the most readily available form of interdisciplinary optimism is the deployment of scientific method on subjects formerly reserved for criticism, appreciation, or interpretation. Consilience, E. O. Wilson's familiar argument that all phenomena derive from and are legible as atomic matter (*Moby-Dick* being nothing more than a composition of atoms composed by a brain composed of atoms), is perhaps the example par excellence.²³ According to this model, scientific explanation can in fact explain the entirety of human experience, and the humanities have little to give the sciences except their objects of study as a golden calf. Despite this asymmetry, a great deal of interdisciplinary research on the human mind, literature, and the environment defaults to some version of consilience. Consider, for example, the so-called literary

Darwinism, which attempts to understand novels and poems as indexes of evolutionary development in the human species, and “neuroaesthetics,” which strives for a biological and brain-based theory of art.²⁴ Conversely, the extension of humanities methods to topics usually reserved for scientific research—almost always, unsurprisingly, by humanists—rarely leads to claims meaningful or intelligible to scientists. Jake Kosek’s *Understories: The Political Life of Forests in New Mexico*, an acclaimed anthropology of resource extraction and environmental politics, includes a lyrical commentary on nuclear testing that adheres to this logic. “Living next to a deeply secretive, historically deceptive nuclear research complex that produces a highly volatile, mobile, odorless, tasteless, invisible substance that is unimaginably enduring and deadly in its toxicity blurs the traditional boundaries between material and imaginary,” Kosek writes in a lucid theory of how nuclear testing alters the assumed parameters of nature itself.²⁵ Kosek goes on to explore the “haunting” persistence of radiation in different objects and sites. One could imagine a scientist admiring such a powerful and creative account of nuclear testing’s impact on human and nonhuman communities. But it is difficult to imagine a scientist recruiting Kosek’s work even indirectly, even in a grant-writing context.²⁶ The transmission back and forth across the divide might be smooth, but the use-value of the optimistic “product” is dubious. The unwanted foray of one discipline into another can actively work against the production of shared knowledge.

Without passing judgment on the value of these unlimited cross-applications, the desire for science to function normatively frequently underwrites these limitless and reductive types of optimism and substitutes for a scientific payoff. Whether imagined as either ideology critique or teleology, a normative science is usually figured as merging with or adopting the political imperatives of the humanities.²⁷ How might the sciences change the objective reality that they explain? For the better one would presume? The politics at play, indebted to Marx and Hegel, are almost always liberating and oppositional, if not outright leftist. Today, in the American public sphere, the query of how Kosek might speak to scientists is answered with the figure of the scientist-activist, who defends the pursuit of science as simultaneously outside the political, contingent on a particular politics, and normative. The possibility remains that a type

of interdisciplinary activism, deriving from either consilience or its converse, could solve the paradox of smooth transmission without utility. “Sci-activism” attempts to preserve climate science, but an activism without such a programmatic vision might be pessimistic.

In the absence of laboratories where poems can be pipetted and centrifuged, and in a more limited sense than consilience or its converse, researchers have adopted experimental techniques and computational models to test hypotheses about topics as diverse as the genres of novels and the speeches of American presidents.²⁸ Known in the humanities at large as the “digital humanities” (and occasionally in literary studies as “distant reading”), constructing digital archives and large text corpuses and applying statistical analysis to the data involves both, as Steven E. Jones notes, “using computers to research literature or art or history” and employing “the methods, insights, and research questions of the humanities to the study of computing and digital media.”²⁹ This immense and complex field proves difficult to characterize as a whole; however, its basic premises are that cultural artifacts are susceptible to algorithmic processing and therefore falsifiable scientific explanation, and that such explanation yields knowledge valuable to humanists and, maybe, scientists. Digital humanities approaches to the study of nuclear testing regimes and oceanography abound. The National Endowment for the Humanities’ Digital Humanities Start-Up Grant for “Re-Framing the Online Video Archive: A Prototype Interface for America’s Nuclear Test Films” is just one example. The project statement expresses a primary interest in “the visual representation of nuclear weaponry as a morally acceptable tool of the State. Our interest is in learning how photographs and films of human operators at work on such systems have helped citizens address, dismiss or ignore the moral questions surrounding atomic warfare.”³⁰ To accomplish these goals, the investigators archived test films in digital formats using metadata like tags on individual videos and documentary materials keyed to those tags. The digital humanities are optimistic insofar as they apply quantitative, empirical methods to artifacts from the history of science in order to draw confident, scientifically verifiable conclusions about the world. The optimistic classification is not to disparage the digital humanities’ validity or value. Rather, we hope simply to recognize

the subsuming tide of optimism, with its untested premises, in the development of these projects.

“Re-Framing the Online Video Archive” also represents two ways that a scientific perspective might conceive and use optimistic interdisciplinary research: using the humanities to improve communication of research to the public and adapting to the insights of the sociology or history of science to optimize methods. The humanities as helper, sciences as hamburger. Both pedagogical and progressive modes beg the question—what if a smooth transmission from sciences to humanities—here, designing museum exhibits or websites or studying the internal processes and histories of scientific fields in order to improve science—is not so smooth or does not in fact educate or improve? Of course, optimistic interdisciplinary research can be smooth and useful. But a default to the optimistic forecloses entire fields of interdisciplinary collaboration that do not beg the question, but instead experiment with low permeability between the disciplines or shift attention away from instrumental research outcomes.

Interdisciplinary Pessimism

JB: How interesting, provocative, or stimulating of a node is either surf punk or bomb radiocarbon in organizing this project?

FP: I’ve found it stimulating but difficult.

JB: What was difficult about it?

FP: With bomb radiocarbon, it’s trying to think of it outside my usual terms, which is a tool to understand physical processes on Earth. And instead, we’re using it as a tool to understand how you organize ways of thinking or ways of studying things. I’m thinking of bomb radiocarbon in a way that I never think about it. I would have never thought about it otherwise except as a hammer with which to hit the nail of, “how fast does the ocean mix?”

JB: I’m surprised by how much this project has improved the quality of my thinking. Once you create a method and commit to it, you have to interrogate whether or not you’re being true to your protocols, and if not, whether that means the method is fundamentally flawed.

Whereas interdisciplinary optimism is infrequently collaborative—it is difficult to find examples of work in which physical scientists work directly with humanists under such parameters—the starting point for interdisciplinary pessimism is collaboration without the promise or prospect of mutual understanding or utility. Ironically, promoting open-ended and equal exchange between distant disciplines requires no expectation that the process will generate positive knowledge. And despite optimism’s stranglehold, open-ended and equal exchange is ongoing in the status quo as a mode that almost never receives explicit institutional support. With funding limited for even the most obviously justifiable interdisciplinary projects, optimism beats pessimism in the scrabble for grant dollars. Further, when the two modes are brought into proximity, optimistic interdisciplinarity tends to coopt pessimistic by turning its internal processes toward predetermined ends. Ideally, a more moderate version of pessimistic interdisciplinarity might coexist uneasily with the optimistic, agitating and antagonizing.

One modest kind of interdisciplinary pessimism is informal conversation. Academic caricatures notwithstanding, the structure of the contemporary university is inhospitable to chitchat. Science and humanities departments are often located at opposite ends of a campus. Few venues exist to promote free dialogue, except where project-oriented funding schemes exist. One maligned proposal for the future of higher education goes all in on the latter idea. A division of the university by subject or problem area; for instance, a “Water Program” that would study the entire range of earth science, infrastructural, and cultural systems involving, well, water, has been criticized as the next logical step in the university’s corporatization.³¹ Indeed, a “Water Program” seems to embody everything bad about interdisciplinary optimism, including its bias towards instrumentality, “real world” solutions, and profit. Managerial, business-sensitive planning, however effective it may be, fosters a vision of the world as reducible to case studies. Yet one could imagine semi-formal innovations in a university that would replicate the “Water Department” without an insistence on “problem solving.” Breaking down barriers in the built environment—creating shared office spaces, lounges, classrooms, and even housing—might foster friendship without an

emphasis on linear collaboration in which outcomes are predetermined and limited.

At its heart, informal talk is nonconclusive. There is no “point” to conversing about the weather, sports, movies, music, families, or food—no purpose beyond encouraging the amicability key to the corporate workplace, a cynic might suggest. Routine friendliness can, however, reflect a genuine concern for others and lead to unexpected connections. Shared interests and deep bonds develop in ordinary interaction, even if work eventually transcends the water cooler. Solidarity, mapped around a set of habits of mind and intellection, not politics or material enrichment or institutional survival, offers nonlinear paths to nondeterministic knowledge creation.

An object like bomb radiocarbon, legible in both the sciences and the humanities, does not *prima facie* demand any sort of interdisciplinary work. Achieving better understandings of nuclear testing regimes, their history, politics, cultural representations, and consequences for earth science does not require humanists to adopt scientific methods, or vice versa, nor does it require humanists and scientists to collaborate in instrumental or noninstrumental ways. Yet interdisciplinary pessimism, in the form of nonconclusive talk, could uncover previously unrecognized “problem spaces” or methods for thinking about bomb radiocarbon. What follows nonconclusive small talk can seem nonsensical, absurd, or pointless, according to the accounting of the corporate university. By talking (writing) and thinking about the genre of “surf punk,” we hope to reveal some shriveled fruits of interdisciplinary pessimism. Rather than conducting a reading of surf punk that analyzes its aesthetic forms or ideological content, that purely contextualizes surf punk in the history of nuclear testing, or that assesses its contributions to scientific research on radioisotopes, we engage in a process of conversation, represented here through transcriptions. The following thoughts about surf punk, generated through nonconclusive talk, ratify the bounds of our respective disciplines while deriving from no parent methodology. Talking about the surf punk–bomb radiocarbon nexus in nonconclusive ways opens a greater range of possible outcomes than the optimistic approaches outlined above. Although these outcomes may seem ineffectual or diluted in comparison to actionable strategies or

material knowledge, they are ultimately better adapted to the environmental timescales of nuclear testing.

FP: Why did you choose surf punk? It was on our syllabus for a class on “Oceans in Science and Literature” that we designed a year and a half ago, before we started working on this essay. I remember thinking then, “I don’t even know what surf punk is, but it sounds like something that exists.”

JB: That’s what I’m interested in, the “I don’t know what this is” phenomenon. Most people know what surf music is and what punk is. Surf punk sounds like it should exist and does exist, but it’s hard to say what it actually is, except that surf punk takes the practices and aesthetics of surf culture to the darkest, most abject places. If you watch a movie like *The Endless Summer* from 1966, a movie where people go to surf beautiful beaches, or if you listen to the Beach Boys, it’s all about how surfing makes you feel good vibrations and live a fulfilling life. Punk music is antithetical to that worldview. I think what punk rockers see in surf music is a freedom sympathetic to the punk lifestyle. Surfing embodies a way of being free in “nature,” mediated through a hypercommercialized culture, and surf punk is an appealing distortion of that relation to the ocean.

FP: So do you view surf punk as explicitly rejecting the capitalist overtures in surf music?

JB: Surf punk carves out a protected space in the feedback loop of commercializing rock. The genre is, in a certain sense, not always that great. Agent Orange’s cover of “Miserlou,” right? It’s not as good as Dick Dale’s version. Agent Orange puts a punk rock beat over the surf guitar riff, and now we have surf punk? It doesn’t always come off successfully. It’s hard to commercialize because it can slide into a bad kind of bad.

FP: Its failure is part of its virtue.

JB: Absolutely.

FP: That sounds suspiciously like what we’re talking about with interdisciplinary pessimism. Not because it’s unsuccessful, but because it has the option to be unsuccessful.

Surf punk is a weak genre—a “classifying principle” that bleeds around the edges.³² A few music writers invoke it to describe movements within the broader surf and punk rock genres; the Wikipedia page on “Surf Music” gives it a short subhead; there is even a semi-obscure Malibu band, founded in 1976, called the Surf Punks.³³ But no heuristic separates surf from punk from surf punk aside from an ad hoc judgment, “I know it when I hear it.” The “it” that consistently arises according to this judgment is defined by an uptake of surf guitar riffs and themes—hanging out at the beach, watersports and adventures, fun in the sun, and California girls and boys—into a noise-centric and nihilistic punk frame. Nostalgia for the 1950s and 1960s rendered dark and distorted, the naivety and optimism of those periods refracted through a post-Vietnam, post-Nixon lens. The *Encyclopedia of Music in the 20th Century* calls surf punk an ’80s “revival of the original surf music,” citing the band Forgotten Rebels’s record “Surfin’ on Heroin,” and it seems fair to grant the genre at least this one solid contour.³⁴ Other bands clustered around this moment include JFA (established in 1981 and more closely associated with skate punk), which mashed surf classic “Pipeline” by the Chantays with “Police Truck” by the Dead Kennedys to cut “Pipe Truck”; Agent Orange (founded in 1979), which covered among other surf standards “Miserlou,” a traditional Mediterranean song made surf famous by Dick Dale; and the aforementioned Surf Punks, authors of original surf punk compositions like “Surfer’s Nitemare,” “Beer Can Beach,” and “Shark Attack.”³⁵ These surf punk bands may be minor figures in the longer histories of surf and punk rock, but the surf punk genre influenced the music of several more popular groups like the Ramones and the Clash. Mainstream surf punk tracks—in particular, the Clash’s “Charlie Don’t Surf”—offer a unique if unproductive reflection on nuclear testing’s release of bomb radiocarbon into the oceans.

Introduced on the fifth side of their triple album *Sandinista!* (1980), “Charlie Don’t Surf” responds directly to Francis Ford Coppola’s 1979 film *Apocalypse Now*, an adaptation of Joseph Conrad’s novel *Heart of Darkness* to the Vietnam era. Martin Sheen’s Marlow-cum-Captain Benjamin L. Willard must assassinate Marlon Brando’s Kurz, rewritten as a Green Beret gone rogue in the jungles of Cambodia. *Apocalypse Now* has inspired decades of debate. Is the movie pro-

war, antiwar, or ambivalent? Viet Than Nguyen's recent novel *The Sympathizer* bypasses this dilemma to highlight Coppola's racist reduction of Vietnamese people to animate props, but we might locate the crux of the pro- versus antiwar debate in the film's strange fixation with surfing. Willard's team includes Lance, "a famous surfer from the beaches south of LA" who water skis to the Rolling Stone's "(I Can't Get No) Satisfaction," and it turns out that Robert Duvall's Lieutenant Kilgore, a maniacal commander who loves nothing more than battle, also appreciates a good wave. In the middle of combat, Kilgore offers his canteen to a wounded enemy soldier, but stops his obscene performance of humanitarian mercy to greet Lance and tell him, "we do a lot of surfing around here." Kilgore chooses the insertion point for Willard's boat because of its surfing prospects, and when one of his soldiers objects that the Viet Cong control the neighboring village, Kilgore rebuts, "Charlie don't surf!" The line, clearly the Clash's inspiration, is delivered by a character both mythologized and reviled in the film. Because the Vietnamese, homogenized and denigrated through a racist slur, do not surf (or participate in American capitalism and its culture industries), they cannot pose real resistance to Kilgore's real objective, riding a tube. By directing the mission around the perverse desire to surf, Kilgore suffuses an uncomplicated, nostalgic vision of American masculinity, the surfer, with racial violence. Surfing is compromised and redeployed for ends other than good vibrations: an ironic performance of nonchalance in the face of death. "Charlie don't surf" comes to represent the governing order of American warfare, a disregard for the lives of civilians on the grounds of their non-Westernness.

FP: I would never willingly listen to surf punk music.

JP: Even "Charlie Don't Surf?"

FP: I think that "Charlie Don't Surf" was actually my least favorite of the surf punk music.

In "Charlie Don't Surf," the Clash adopts the riffs and themes of surf punk to situate the genre in the immediate context of Cold War militarism. Rather than Kilgore's "Charlie don't surf," the Clash sing, "Charlie don't surf and we think he should." The song both ventriloquizes Kilgore, confirming his racist position as true, and expresses

a normative, counterfactual claim. The line might be read as a call for targets of Cold War imperialism to Westernize in order to avoid destruction or a plea for resistance. But regardless of capitulation or revolution, the end is unavoidable: the apocalyptic terminus of the geopolitical order. Verses like, “everybody wants to rule the world / . . . Satellites will make space burn,” rehearse Kilgore’s logic and point to planetary cataclysm. The surf punk genre thus becomes the lexicon through which the unspecified apocalypse of “apocalypse now” is enunciated and mystified. If surfing in *Apocalypse Now* reflects the illogic of the Vietnam War and celebrates its Nietzschean bravado, the Clash translate the film’s figure of the surfer into a punk frame to spectate on the Earth’s inevitable annihilation. Surf punk’s representation of wartime surfing is doubly mediated through this system, extracted through retrospective media like *Apocalypse Now* and the war-making apparatus of the West. Under such conditions, the critical power of punking surf slips into celebration or verification. In this way, “Charlie Don’t Surf” might simultaneously salivate over and denounce the Cold War’s abhorrent violence.

FP: I had some unverifiable, unknowledgeable opinions about surf punk.

JB: Like what?

FP: Surf punk existed within the margins of two other things without existing on its own at any point. It pushed back without actively pushing back. It advocated for something that it didn’t actually do. I see that as a passive counterculture.

As modeled in “Charlie Don’t Surf,” the surf punk genre holds an indeterminate relationship to the broad context of the nuclear testing regime. Insofar as the 1963 Limited Test Ban Treaty predates the emergence of surf punk by two decades, “Charlie Don’t Surf” is necessarily retrospective, like *Apocalypse Now*. In the case of bomb radiocarbon, however, retrospection might serve to analyze ongoing and persistent phenomena, for example, Cold War nuclear fallout localized to a past event (testing) or the specter of nuclear war. The contextual relationship of the Vietnam War to *Apocalypse Now*, structured around the film’s localization of the war to the past and refusal to witness its persistent environmental and bodily effects, does not generalize to the relationship between the Vietnam War or the Cold

War and “Charlie Don’t Surf” or surf punk. The advantage of surf punk, as a generic mode of representing the violence of war, seems to be its capability to register the expansive and nonhuman timescales over which acts of war like nuclear testing or the invasion of Vietnam persist.

JB: One problem with interdisciplinary optimism is that it’s conservative. Interdisciplinary optimism—

FP: Wants to preserve.

JB: To live forever on 1999 Earth, or something like that.

FP: And it can’t properly adapt to timescales that we can’t imagine. Which is where these arguments about radioactivity come into play, right? People have claimed that mitigation plans for radioactive contamination are nonsense because they play out over such long timescales—

JB: They can’t even imagine.

The nexus of surf punk and bomb radiocarbon could only be described as partially visible, indirect, or oblique. Just as bomb radiocarbon indexes the Earth system’s response to greenhouse forcing, surf punk indexes scales of radioactive contamination and climate apocalypse. That is, surf punk marks the entanglement of nuclear testing, its underlying motives and intended effects, and anthropogenic shifts in climate systems. In this capacity, surf punk is itself a kind of countercultural context to atmospheric testing’s continuous present and unforeseeable future, not to mention its applications in oceanographic research about our changing climate. As opposed to theories of art and cultural production that posit a critical or resistant axis latent in the text, or countercultures that mobilize activists, protesters, and artists, surf punk is passive. “Charlie Don’t Surf” does not criticize *Apocalypse Now* so much as bring it into contact with the environmental traumas of the Cold War and their enduring, suprahuman properties. Faced with a phenomenon that exceeds the scale of human civilization, biology, or experiential comprehension, a passive counterculture like surf punk is oppositional and inactive.³⁶

Surf punk’s technique is to direct attention, not to determine conclusions, if any. An interdisciplinary conversation about surf punk

might therefore devolve, tautologically, to recursive conversation. Would a mere impetus to talk about talking be enough to count as interdisciplinary work of some fashion, even or especially if it led to no concrete hypotheses or interpretations? Perhaps talking collaboratively about surf punk's contextualizing features might suggest new structures for organizing interdisciplinary climate studies that would conform to surf punk's mash-up paradigm. According to this thesis, to uptake surf into punk while preserving their respective particularities might be to uptake one discipline into another without instrumental, purposive, or conclusive goals.

FP: Why would anyone spend their time doing what we've been doing?

JB: That question is trapped in a way of thinking that prescribes outcomes.

FP: Your job is dependent on generating outcomes for your university, like getting a grant, right?

Analogical reasoning risks a kind of disciplinary nihilism, in which one discipline seeks to mutilate, distort, and obliterate another. One alternative to this negativity is the pursuit of creativity. Taking cues from the Clash might not be the best way to research climate change, but it might not be the worst. Making art, or more generally, participating in creative projects that preserve disciplinary boundaries, could represent one appealing form of pessimistic climate studies. The resulting artworks and their relative degrees of political efficacy or knowledge-generation are irrelevant. A background state, analogous to surf punk's passive counterculture, out of which the artwork emerges is a possible outcome of interdisciplinary pessimism.

The injunction to abandon interdisciplinary optimism and start bands or artists' collectives or talking about stuff is vulnerable to objection on the grounds of absurdity. But this essay's advocacy is not a dadaism or nihilism, as one misinterpretation of surf punk might suggest. Kurtz's final warning, that "horror has a face and you must make a friend of horror. Horror and moral terror are your friends. If they are not, they are enemies to be feared," is not the necessary correlate of pessimism. Surf punk's insight is that objects of study like bomb radiocarbon or climate change invite new disciplinary protocols that do not assume either the smooth transference of knowledge and method across disciplines or the production of usable knowledge

and practical solutions. Nuclear testing, the Cold War, and Vietnam provoke in surf punk an apprehension of what cannot be apprehended directly: radioactivity and anthropogenic warming emanating from the military-industrial complexes of the “superpowers.” Interdisciplinary pessimism ought to aim its gaze at these catastrophes as they unfold on timescales imperceptible to human life.

FP: I don’t know, is that also grounded in the late-nineties upper middle-class, white American values?

JB: Probably, but my way of getting around that is to imagine a counterfactual in which you’re a colonist on an alien planet.

FP: Like a desert planet where it rains once every thousand years?

JB: Or even more outside the realm of human imagination. We live on a planet that orbits a red dwarf, where instead of chlorophyllic photosynthesis, photosynthesis happens in the infrared spectrum. Everything is black. It’s hard to imagine the human organism not going insane under those conditions. Right?

FP: I would agree.

JB: There seems to be some kind of problem with preserving the category of the human and also imagining a solution to climate change.

FP: We have no idea what the future might hold, what the outcomes should be, or what timescales they evolve over. The advantage of interdisciplinary pessimism is that it encompasses unimaginable things as they come up.

NOTES

1. These conversations are transcribed from recordings made by Jason and Frankie in May 2017.

2. Willard F. Libby, “Atmospheric Helium Three and Radiocarbon from Cosmic Radiation,” *Physical Review* 69 (1946): 671–72.

3. Hiroyuki Kitagawa and Johannes van der Plicht, “Atmospheric Radiocarbon Calibration to 45,000 yr B.P.: Late Glacial Fluctuations and Cosmogenic Isotope Production,” *Science* 279 (1998): 1187–89.

4. Reidar Nydal, “Increase in Radiocarbon from the Most Recent Series of Thermonuclear Tests,” *Nature* 200 (1963): 212.

5. U.S. Department of State, The Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water with U.S.S.R. and U.K., August 5, 1963, 14 U.S.T. 1313, T.I.A.S. No. 5433.

6. Quan Hua, Mike Barbetti, and Andrzej Rakowski, "Atmospheric Radio-carbon for the Period 1950–2010," *Radiocarbon* 55 (2013): 2059–72.
7. Reidar Nydal and Knut Lövseth, "Tracing Bomb ¹⁴C in the Atmosphere 1962–1980," *Journal of Geophysical Research* 88 (1983): 3621.
8. Ingeborg Levin and Vago Hesshaimer, "Radiocarbon—A Unique Tracer of Global Carbon Cycle Dynamics," *Radiocarbon* 42 (2000): 69.
9. Minze Stuiver, "¹⁴C Distribution in the Atlantic Ocean," *Journal of Geophysical Research* 85 (1980): 2711–18.
10. Ulrich Siegenthaler and Fortunat Joos, "Use of a Simple Model for Studying Oceanic Tracer Distributions and the Global Carbon Cycle," *Tellus* 44B (1992): 186–207.
11. See Dipesh Chakrabarty, "The Climate of History: Four Theses," *Critical Inquiry* 35 (Winter 2009): 220–22; and Jana Silliman et al., "Climate Emergencies Do Not Justify Engineering the Climate," *Nature Climate Change* 5 (2015): 290–92.
12. See Matthew Collins et al., "Long-term Climate Change: Projections, Commitments, and Irreversibility," in *Climate Change 2013: The Physical Science Basis*, ed. T. F. Stocker et al. (Cambridge: Cambridge University Press, 2013), 1029–106.
13. See, for example, Rafael Reuveny, "Climate Change–Induced Migration and Violent Conflict," *Political Geography* 26 (August 2007): 656–73; and Céline Bellard et al., "Impacts of Climate Change on the Future of Biodiversity," *Ecology Letters* 15 (2012): 365–77.
14. For an example of a proposed technological fix to combine with mitigation efforts, see T. M. L. Wigley, "A Combined Mitigation/Geoengineering Approach to Climate Stabilization," *Science* 314 (October 2006): 452.
15. Susan Solomon, Gian-Kasper Plattner, Reto Knutti, and Pierre Friedlingstein, "Irreversible Climate Change Due to Carbon Dioxide Emissions," *PNAS* 106 (2009): 1704.
16. See, for example, Hans-Martin Füssel, "Vulnerability: A Generally Applicable Conceptual Framework for Climate Change Research," *Global Environmental Change* 17 (May 2007): 155–67. One recent development in this area is the start of coalitions to preserve research resources in the face of political uncertainty.
17. Colin N. Waters et al., "Can Nuclear Weapons Fallout Mark the Beginning of the Anthropocene Epoch," *Bulletin of the Atomic Scientists* 71 (2015): 46–57.
18. To a certain extent our technique comes to resemble Lee Edelman's vision for "the impossible project of a queer oppositionality," which refuses "history as linear narrative (the poor man's teleology) in which meaning succeeds in revealing itself—as itself—through time." See Lee Edelman, *No Future* (Durham, N.C.: Duke University Press, 2004), 4. What would an interdisciplinary method look like with no future?
19. See Jonathan Kramnick and Anahid Nersessian, "Form and Explanation,"

Critical Inquiry 43 (Spring 2017): 650–69; Jonathan Kramnick, “The Interdisciplinary Fallacy,” *Representations* 140 (Fall 2017): 68.

20. This short statement about falsifiability derives almost entirely from the work of Karl Popper. Whereas the sciences falsify, the humanities prove—that is, the emphasis on argument in the humanities is a sign that what humanists do is methodologically distinct from scientific research. See Karl Popper, *The Logic of Scientific Discovery* (London: Taylor and Francis, 2005), 18.

21. C. P. Snow, *The Two Cultures and the Scientific Revolution* (New York: Cambridge University Press, 1961), 4.

22. See Carole L. Palmer and Laura J. Neumann, “The Information Work of Interdisciplinary Humanities Scholars: Exploration and Translation,” *The Library Quarterly* 72 (January 2002): 85–117; *Practicing Interdisciplinarity*, ed. Peter Weingart and Nico Stehr (Toronto: University of Toronto Press, 2000); Robert Prodehan, ed., *The Oxford Handbook of Interdisciplinarity* (Oxford: Oxford University Press, 2010); Andrew Barry, Georgina Born, and Gisa Weszkalnys, “Logics of Interdisciplinarity,” *Economy and Society* 37 (2008): 36–38, 41–42; and Moti Nissani, “Ten Cheers for Interdisciplinarity: The Case for Interdisciplinary Knowledge and Research,” *The Social Science Journal* 34 (1997): 201–16.

23. Edward O. Wilson, *Consilience: The Unity of Knowledge* (New York: Vintage, 1999). See also *Darwin’s Bridge: Uniting the Humanities and Sciences*, ed. Joseph Carroll, Dan P. McAdams, and Edward O. Wilson (New York: Oxford University Press, 2016), and Edward Slingerland, *What Science Offers the Humanities: Integrating Body and Culture* (Cambridge: Cambridge University Press, 2008).

24. See Joseph Carroll, *Literary Darwinism: Evolution, Human Nature, and Literature* (New York: Routledge, 2012), and Anjan Chatterjee, “Neuroaesthetics: A Coming of Age Story,” *Journal of Cognitive Neuroscience* 23 (January 2011): 53–62.

25. Jake Kosek, *Understories: The Political Life of Forests in Northern New Mexico* (Durham, N.C.: Duke University Press, 2006), 258–59.

26. We are open to the idea that programs like the National Science Foundation’s Science, Technology, and Society grants can produce interesting pessimistic interdisciplinary work.

27. Roy Bhaskar’s “critical realism” offers one scheme for this merger. See Roy Bhaskar, *Scientific Realism and Human Emancipation* (London: Routledge, 2009).

28. See Sarah Allison et al., “Quantitative Formalism: An Experiment,” *Stanford Literary Lab*, January 15, 2011: 3–6, and Dan Faltesek, “Obama’s Sixth Annual Address: Image, Affordance, Flow,” *Digital Humanities Quarterly* 10 (2016), <http://www.digitalhumanities.org/dhq/vol/10/4/000280/000280.html>.

29. Steven E. Jones, *The Emergence of the Digital Humanities* (New York: Routledge, 2014), 6.

30. Kevin Hamilton and Ned O’Gorman, “Re-Framing the Online Video

Archive: A Prototype Interface for America's Nuclear Test Films," *NEH5*, <http://illinoisneh50.omeka.net/exhibits/show/pastfive/reframing>, accessed May 18, 2017.

31. The proposal in question emerges in an op-ed by Mark C. Taylor, "End the University as We Know It," *New York Times*, April 26, 2009.

32. Wai Chee Dimock, "Critical Response I: Low Epic," *Critical Inquiry* 39 (Spring 2013): 623.

33. See Konstantin Butz, *Grinding California: Culture and Corporeality in American Skate Punk* (New York: Columbia University Press, 2012); Marc Spitz and Brendan Mullen, *We Got the Neutron Bomb: The Untold Story of L.A. Punk* (New York: Random House, 2001); Colin J. Campbell, "'Three-Minute Access': Fugazi's Negative Aesthetic," in *Adorno and the Need in Thinking*, ed. Donald A. Burke, Colin J. Campbell, Kathy Kiloh, Michael K. Palamarek, and Jonathan Short, 291 (Toronto: University of Toronto Press, 2007); Timothy J. Cooley, *Surfing about Music* (Berkeley: University of California Press, 2014); and Dewar MacLeod, *Kids of the Black Hole: Punk Rock in Postsuburban California* (Norman: University of Oklahoma Press, 2010), 121.

34. Judi Gerber, "Surf Music," in *Encyclopedia of Music in the 20th Century*, ed. Lee Stacey and Lol Henderson (New York: Routledge, 1999), 619.

35. Bill Brown claims that JFA looked "uncomfortable, even a little guilty" during performances of their "surf/punk" repertoire. Bill Brown, *You Should've Heard What I Just Seen: Collected Newspaper Articles, 1981-1984* (Cincinnati: Colossal Books, 2010), 106.

36. Rei Terada theorizes oppositional inactivity as the Romantic "impasse" in her essay "Looking at the Stars Forever," *Studies in Romanticism* 50 (2011): 280. According to her account, an "impasse is a kind of barricade to create space for a world in which futility can no longer be a reason for not doing something."