

After Culture: Reflections on the Apparition of Anthropology in Artificial Life, a Science of Simulation

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The anthropology of science often scrutinizes the practices of people for whom “culture” has become a common-sense term. In North America and the United Kingdom at least, where the concept has traveled from anthropological enunciation into popular consciousness, most scientists are happy to describe their work as emblematic of their disciplinary culture or as textured by its location in academic, corporate, and/or military cultures. They have accepted C. P. Snow’s founding assumption in *The Two Cultures* (1959) that science, like the humanities, is a cultural formation. So, although Sharon Traweek famously found that the American physicists of whom she wrote possessed “a culture of no culture” (1988:162), we might note that many scientists have in fact come self-consciously to dwell in “culture,” to view themselves through an anthropological optic. Moreover, a recent volume of interviews with contemporary scientists entitled *The Third Culture* (Brockman 1995) suggests that such figures as chaos theorist J. Doyne Farmer and evolutionary biologist Richard Dawkins have taken on the work of bridging the gap between Snow’s estranged humanists and scientists, creating the “third culture” that Snow, in the second edition of his book, *The Two Cultures: A Second Look* (1963), hoped would emerge from the ranks of literary intellectuals and social historians.¹ John Brockman, editor of *The Third Culture*, declares that “what traditionally has been called ‘science’ has today become ‘public culture’ ” (1995:18), “rendering visible the deeper meanings of our lives, redefining who and what we are” (1995:17).² But if many scientists have come to see science as culture, it is only in partial connection with their anthropological interlocutors. The science wars of the 1990s made this much clear. Nonetheless, tuning into how scientists invoke “culture” in their self-descriptions is essential if anthropologists of science are to understand “science as culture” as well as the public legacies of their own discipline’s articulations of the culture concept.

What effects does an awareness of abiding in “culture” have on how scientists understand the work they do? How have distinctively anthropological

versions of “culture” entered into circulation in the lifeworlds of scientists? In the wake of literary, feminist, and postcolonial renovations of the anthropological project—reassessments that pushed many ethnographers away from a scientific quest for laws toward more interpretive examinations of meaning, representation, and power—how different are contemporary cultural anthropologists’ notions of culture and those of practicing scientists? And what happens when these notions encounter one another? There are surely a variety of answers to these questions, but in this article I would like to offer one informed by fieldwork among a group of scientists whom I found particularly attuned to anthropological formulae. Many of these people, who came of age in the counterculture of the sixties, saw their scientific work as challenging accepted orthodoxies, as going counter to what they termed the dominant “cultures” of their fields. And more than a few told me that this view grew in part from formative moments in college anthropology courses in which they had learned to see knowledge as culturally conditioned. In this brief meditation, I reflect on ethnographic work I conducted among Artificial Life scientists at the Santa Fe Institute for the Sciences of Complexity in New Mexico, an interdisciplinary research center dedicated to computer modeling in fields ranging from physics to biology (and which has hosted “third culture” notables Farmer and Dawkins).³ Artificial Life is devoted to the simulation of evolutionary systems and to the use of such simulation to theorize the biology of the possible, to locate *life-as-we-know-it* within the larger frame of *life-as-it-could-be* (Langton 1989:1). Artificial Life is a deliberate oxymoron, meant to edge us toward considering the possibility that “life” might not be an exclusively “natural” object or process; new forms of life might come into being, for example, *in silico*, with genomes built in the binary code of zeroes and ones (Farmer and Belin 1992). As a sort of theoretical biology aimed at simultaneously specifying and expanding the notion of vitality, Artificial Life is premised on a perpetual re-evaluation of its founding category—“life”—and of the experimental and theoretical implications of its methodology—computer simulation. This extraordinary charter invites researchers to ask whether “nature” is reflected or constructed in their models. And the interdisciplinary character of the enterprise (attracting computer scientists, evolutionary biologists, and physicists) prompts explicit discussion about the role of disciplinary “culture” in framing accounts of the vital. Indeed, a particular model of “culture” animates these conversations, one continuous with popular senses of the term in the United States and one indebted to anthropology, even as it is distinctive to Artificial Life. In these discussions, culture oscillates between relativist and universalistic meanings, and is sometimes refracted through both. In meditating on the multiple resonances of “culture” in science, then, I found Artificial Life is good to think with.

What is “culture” for Artificial Life scientists? I discovered that the primarily Euro-American Artificial Life researchers among whom I did fieldwork in the mid-1990s operated with a culture concept recognizable from 1960s and 1970s American anthropology, a concept simultaneously indebted to the

strong idealist strain of the Boasian tradition and to cultural ecology. The “culture” toward which many researchers gestured was culture understood as a set of ideas conditioning perception. They saw evolutionary biologists and computer scientists, for example, differently describing and envisioning “life” owing to their dissimilar “cultures.” On a grander scale, Artificial Life researchers also saw culture—in the singular, more universal, sense—as an adaptive system, a homeostatic device keeping humans in sync with their environment. For them, ideational and adaptive features were united in a vision of culture as a system of *information*, as a cybernetic artifact natural to the human condition. Science was culture in that it was a system of adaptive knowledge-making. Seeing things this way was certainly not at odds with the idea that science could be a cultural practice dedicated to getting at a reliable representation of reality. But neither did it foreclose a sort of relativism, an openness to the possibility that there might be many viable representations. In “American Moderns: On Science and Scientists,” Paul Rabinow defines modern subjects as “pluralistic, even perspectival about things social” (1999:321). I would say that Artificial Life scientists were “perspectival about things natural” as well, especially as that “nature” was theorized through the artificial, the simulated, the virtual—through sets of socially and culturally constructed technologies.

No wonder, then, that when I approached Artificial Life scientists about doing fieldwork among them, I met with a generally favorable response. Not only did many of the people I interviewed have a keen sense of themselves as perspectival knowers, they also thought that anthropology’s toolkit might be useful to them in theorizing the role of “culture” in conceptualizing vitality. As I told them at the time, I was interested in how Artificial Life scientists narrated and viewed the computer simulated worlds within which they created and theorized digital simulacra of living things. I wanted to know how scientists’ computational models of possible biologies were inflected by their conceptions and lived understandings of gender, kinship, sexuality, race, economy, and cosmology, and by the specific social and political contexts in which these understandings took shape. For these politically liberal scientists, this was hardly a shocking set of questions, even if it did not overlap entirely with their own. They were more concerned with how “culture” had evolved as a complex capable of reflecting on and representing its own conditions of possibility, and wanted to know how well their own scientific culture might be doing at this task. Having an anthropologist around might help, might give them “feedback.”⁴ In *Reproducing the Future*, Marilyn Strathern opens with a chapter entitled “Artificial Life” and, writing of the cyberspaces in which Artificial Life researchers conduct their experiments, declares: “There is something about these imaginary worlds that would interest a social scientist” (1992b:1). When I did my research, I found that there was something about social science that interested these engineers of imaginary worlds. They saw Artificial Life and anthropology as both investigating worlds made of and on ideas; we might learn much from each other. The apparition of anthropology—the discipline as well as its most noted concept, culture—haunted our interactions. When I

undertook my anthropology *of* Artificial Life, then, I came upon an anthropology *in* Artificial Life (even encountering people who thought that I should script my anthropology *as* Artificial Life, but more on that later).

Where did notions of “anthropology” and “culture” come from for these scientists? Importantly, the computer scientist responsible for christening the field in 1987, Christopher Langton, studied anthropology in his late 20s as an undergraduate at the University of Arizona from 1976–1980, where he became interested in parallels between biological and cultural inheritance and evolution, reading extensively in cultural ecology and cognitive anthropology. As he put it in a paper he wrote at the time, “just as our body is a product of the long complex process of biological evolution, via the mechanisms of genetic inheritance, our mind is the product of a long complex process of cultural evolution, via the mechanisms of cultural inheritance” (1978:1). Langton developed this interest during his graduate study of computer science at the University of Michigan in the 1980s, where he rephrased this concern as an interest in how evolution might be a sort of program operating on replicating information structures in organic and artificial media (at around the same time, this notion was formalized by Richard Dawkins, who gave the name “meme” to his hypothesized unit of particulate cultural inheritance).

During our interviews, Langton referred me to an anthropology text that had stayed with him as he moved from anthropology to computer science: Roy Rappaport’s *Pigs for the Ancestors* (1968). In this book, Langton recounted, Rappaport argued that the Tsembaga Maring of New Guinea maintained local ecological balance through a practice of sacrificing pigs to ancestors, a practice that never needed to refer to the “scientific” facts of ecology in order to be effective. Here, Langton contended, existed a set of constructed cultural truths operating in coordination, but not lock step, with biology. Langton maintained that scientific epistemology, like the knowledge of the Tsembaga Maring, was also a kind of cultural construction, one whose ultimate truth-value we may never know, but whose measure of validity should be whether it produces explanations adaptively adequate to our purposes of prediction. This account accommodates a commitment to scientific truth within the logic of cultural relativism, and uses an example from anthropology to do it.

Langton’s was a very cybernetic vision. “Cultures” were complexes of orienting human ideas that received and adjusted to feedback from “nature.” The availability of this model within anthropology is hardly surprising, since cybernetics was incorporated into American anthropology as early as the 1950s, when Margaret Mead and Gregory Bateson attended the Macy Conferences on Cybernetics (Mead et al. 1950–1956; Wiener 1948). The second edition of Bateson’s *Naven* (1958) famously rewrites the Naven ceremonial as a servo-mechanism maintaining the logical coherence, the equilibrium, of Iatmul *eidōs*, or cultural structure. Boasian notions of culture as an ideational complex floating above a biological substrate, mentalist descriptions of culture as “personality writ large” (Benedict 1934), and Kroeberian accounts of the “superorganic” (1952) fed nicely into cybernetic renderings of culture as a system

of “information.”⁵ Once culture was fitted into this mold, inspiring along the way ever more formalistic portraits as a cognitive system (Frake 1968; Goode-nough 1956), it became possible to gather culture back into the embrace of nature, which by this time, with the help of an evolutionary science freighted with metaphors of genetic coding and ecological messaging, had also morphed into an informatic system. Versions of cultural ecology emerged which made culture both ideational and adaptive (Harris 1966; Rappaport 1968; Steward 1955; White 1949; and see Rappaport 1971 for a meditation on cybernetics); culture, calibrated to nature, could become practical reason—and indeed, in its most advanced and reflexive form, science. To Artificial Life scientists, and to scientists of complexity more generally, who also have lineages reaching back to cybernetics (which first theorized organism and mechanism as coded texts), such recursive fusions of relativism and evolutionism in anthropology make good sense.⁶

This was certainly the opinion of another key Artificial Life scientist, a physicist I interviewed who referred me to cultural anthropology to explain his vision of science as an arbitrary but potentially adaptive system of cultural knowledge. In the 1970s, this man had taken an undergraduate anthropology course at Stanford with George and Louise Spindler, editors of the famous Holt, Rinehart and Winston series of anthropological case studies. He remembered being impressed by discussion of an Australian aboriginal kinship system. He realized that although this system was not in accord with what he took to be the facts of genetics (the “scientific” underpinning of all kinship systems, he thought, in a formulation David Schneider [1968] would have found typical of American middle-class opinion), it underwrote a form of social organization adaptive to the environment in which it flourished. After learning about the Sapir-Whorf hypothesis, he came to regard different languages and cultures as equally viable ways of getting at the world. His attraction to Artificial Life, as he saw it, grew out of sympathy for alternative and unorthodox ways of thinking about life more generally, a sympathy he also developed during collegiate participation in U.S. counterculture. For this man and for Langton (who grew into adulthood around the same historical moment and was a conscientious objector during Vietnam) “culture” was very much about language and world-views. Culture was a tool that mediated vision and existed in coordination with the natural world. This view has a long heritage in American anthropology, reaching back to the oft-repeated tale of Franz Boas’ early physics, geography, and ethnography-inspired argument that the color of sea water depends on the traditions of the people doing the viewing (Stocking 1982).

Artificial Life science stages its experiments in simulated spaces, virtual realities—what researchers term “digital worlds.” The role of vision in accessing these worlds is both technological and deeply imaginative, since researchers must view these spaces through the medium of the computer screen and must learn how properly to read the data and images presented to them. They must learn to “see.” Some Artificial Life scientists discern in their simulations not just models of life, but life itself, realized in a noncarbon medium;

the computer offers not just a perspective on the biotic world, but constitutes a world in itself, full of self-replicating digital organisms. According to many I interviewed, there is a strong intuitive, even mystical, component to coming to this knowledge (see Ray 1994 on "Zen and the Art of Artificial Life"). And here some researchers of Langton's generational vintage used the work of Carlos Casteneda to discuss the porous boundaries between hallucination and perception. They invoked Casteneda's *The Teachings of Don Juan: A Yaqui Way of Knowledge* (1990) both as a source of personal inspiration and as a way of communicating to me, an anthropologist, that they saw their science connected to alternative ways of knowing (this was also a particularly appropriate reference in Santa Fe, where scientists sometimes domesticate New Age references to communicate their science, and where local native peoples are relentlessly romanticized). In his Don Juan books, Casteneda comes under the tutelage of a Yaqui wise man who possesses the keys to a separate reality, one that can be entered with the aid of peyote. Some researchers saw a parallel between peyote worlds and Artificial Life worlds. Both are non-everyday spaces and comprehending them requires realigning one's common sense. The "other" worlds of anthropology and of Artificial Life have something in common. Walter Goldschmidt, Casteneda's doctoral advisor, writes in his introduction to *The Teachings of Don Juan*: "The importance of entering into worlds other than our own—and hence of anthropology itself—lies in the fact that the experience leads us to understand that our own world is also a cultural construct" (Casteneda 1990:10). Artificial Life scientists would argue that simulation practices teach us the same thing.⁷ One researcher put the conclusion to me this way: "The things we understand as life actually have the status of the artificial. They are artifacts of our own thinking. Artificial Life will force upon us the realization that science is our construct."

Artificial Life scientists' perception of me as an anthropologist certainly modulated the allusions they used, even as it is clear that anthropological visions had been critical in their own conceptions of science as culture. At the same time, their notions of culture were clearly different from my own, conditioned in large part by their exposure to earlier iterations of anthropological theory. Trained in the early 1990s, I saw their definitions as outdated, tethered to romantic (though scientized) images of the harmonious cosmologies of non-Western, nonindustrialized peoples. Indeed, even as many people were genuinely sympathetic to my presence, I found the most characteristic perception of my project to be that I would be looking at Artificial Life scientists as a "tribe." This was meant as a good-natured joke and served a double function. It was a peace offering, an acknowledgment that scientists have culture. But it also rendered me harmless, since both my interlocutors and I knew that Artificial Life scientists were not a preindustrial group characterized by some sort of elementary social organization, cosmology, or mode of subsistence. In *Exotics at Home*, Micaela di Leonardo (1998) explores the use of "tribalizing" tropes to describe the practices of people in complex, state-level, capitalist societies (the most famous example of this parodic mode is Horace Miner's [1956] article on

the Nacirema). She names this sort of reversal the “anthropological gambit,” and argues that calling, say, white American businessmen a “tribe” erases the specificity of the historical, political, and economic contexts in which these people exist (and does so even for those people commonly thought of as tribal, too). The gambit only does its irreverent defamiliarizing work when the objects are part of a privileged group; such tribal metaphors will not work, for example, to describe the lives of marginalized people of color in industrialized societies; these will simply come off as racist and ahistorical. Di Leonardo writes: “‘We’ can only be like ‘them’ [the tribal other] if we are white, middle-class or above, heterosexual, &c.” (1998:65). As mostly white Euro-American men (a category to which this author also belongs), Artificial Life researchers risk an unreflective use of this trope—even if their intent is reflexively to signal the possibility that science stands inside a specific culture, even as it hopes to gain critical exteriority. Less problematic, though no less indebted to popular visions of anthropology, were some scientists’ delight in referring to themselves as my “informants,” a term they used both playfully and seriously, since for them, it happened to resonate with their view of culture as a system of information.

Di Leonardo argues that anthropologists have been cast in American popular culture as time-traveling “technicians of the sacred,” “sensitive interpreters of cultural difference and primitive wisdom” (1998:32, 9), “arrogant imperialists misrepresenting subaltern people,” foolish cultural relativists, or, in their more scientific guise, as “human nature experts” (1998:51). At different moments in my research, I was zipped into all these costumes. I was occasionally asked to provide stories of alternative ways of thinking from “non-Western cultures”—which I sometimes did, especially to discuss ways of rendering kinship that were not about the heterosexually enabled recombination of units of informatic inheritance. I offered examples of Mundurucú and Nayar kinship systems to illustrate how patrilineal descent, household formation, and reproductive couplings might not always go hand in hand. When researchers used particularly biblical images to discuss the creation of digital life in cyberspace, I found myself offering coming-into-being stories from polytheistic cosmologies. Sometimes this strategy backfired, sliding me into the slot of the foolish cultural relativist unable to differentiate culture from truth, metaphor from reality.

Even as I was enlisted into this game, I operated with my own model of culture, interested as I was in examining how socially dominant common sense propagated into the tales people told about the life-like dynamics emerging in their simulations. I took “culture,” after Strathern, to consist in part “in the way people draw analogies between different domains in their worlds” (1992b:47), and I followed Yanagisako and Delaney’s (1995) dictum that anthropologists should read *across* such domains. I read evolutionary simulations as artifacts condensing Euro-American cultural meanings about such domains as reproduction, gender, and cosmology. Training in feminist anthropological studies of gender and kinship (e.g., Yanagisako and Collier 1987), historical analyses

of relations among race, gender, and science (e.g., Gould 1981; Keller 1985), and social studies of scientific knowledge (e.g., Latour and Woolgar 1986) helped me map this production of science as culture (Franklin 1995b). I was also inspired by "cyborg anthropology," a practice that seeks to examine "ethnographically the boundaries between humans and machines and our visions of the differences that constitute these boundaries" (Downey et al. 1995:265). But although there were disjunctures between researchers' culture concept and my own, there also were important overlaps. Most obviously, we were both interested in tracking ideas and concepts across boundaries between humans and machines. Artificial Life scientists wanted, for example, to transport the language of information theory into biology, and the language of evolution into computer science. I wanted to follow concepts like gender into their circulation in computer models of reproduction. And we both thought of language as mediating visions of the world, though here I had a more explicit commitment to the idea that vision was always located somewhere, that not all viewpoints had equal power, that "situated knowledges" implicated inequalities by race, gender, sexuality, class, and nation (Haraway 1991).

When I spoke with Artificial Life scientists, then, filtering their words through my idea of culture, we generated diffracting patterns of culture. I use the image of diffraction, with a nod to Haraway (1997), in recognition of the strongly visual metaphors through which these American scientists and I both figured culture. These diffraction patterns became particularly visible in the aftermath of a talk I gave at an Artificial Life conference at the end of my fieldwork, during which I discussed how scientists' self-descriptions as "fathers" of artificial life forms and as "microcosmic gods" located them as heirs to particularly biblical accounts of masculine monogenetic creation and procreation (see Delaney 1986), and rewrote Frankensteinian tales of masculine self-birthing in Western science. I also discussed colonial imagery I found in accounts of creating and ordering digital life in cyberspace. One audience member, taking exception to my analysis, indignantly asked me during the question and answer period to don the hat of anthropologist as disinterested scientist, saying "I had the idea that anthropologists were supposed to come in with an objective approach and not make value judgments about the cultures they observed." Chris Langton, sympathetically defending my approach while couching it in terms of his feedback model of culture, jumped in: "We do have to be very careful that we are not importing into these models, unconsciously, agendas which are part of our culture, and then reading them back out of the models, thereby verifying those very assumptions that we built in without realizing it." Another audience member pressed me to speak in the language of the sciences of complexity: "I wondered if you could identify how your version of anthropology might fit with a theory of complexity, because, ideally, it would be interesting to put your theory in terms of Artificial Life."⁸ Again, Langton intervened, strategically deploying the tribal trope to support my analysis of language and ideas: "An anthropologist, if he was studying a group of people in the Amazon, would not necessarily report his findings in the context of their cosmology.

I think it's perfectly legitimate for him to have his own distinct, descriptive venue." Langton's interventions were often more effective than my own not only because he had a social authority in this context that I lacked but because he employed a concept of culture partially recognizable to both sides.

At this same conference, Langton offered a view he felt reconciled cultural construction with nature. He argued that since we humans who make artificial life are part of nature, artificial life must be natural. He declared that "technology is the current state of nature. We now live with and in 'techno-nature.'"⁹ According to Langton, human culture was a form of artificial life, and as a part of nature, was subject to the laws and tendencies of natural systems, at the same time that its dynamics could be used to alter some of those tendencies. As Langton put it, "Nature is something we want to work with rather than dominate. We should view technology as nature and work toward the naturalization of technology." On this view, nature, while changing as a result of the culture it harbors, ultimately includes and subsumes culture. Marilyn Strathern diagnoses such a view well in her description of the Euro-American sense of nature and culture: "While at one level, a contrast between the natural and the artificial might distinguish different views of culture, it might equally distinguish Culture itself, as intrinsically artificial, from Nature, the source of all that was natural. Cultures, in this European view, [are] artificial creations natural to the human condition" (1992b:48).

Artificial Life researchers, then, were "after culture" in at least two ways (playing here on the title of Strathern's important *After Nature* [1992a]). First, they had come to see themselves as cultural subjects—with vision mediated by an ideational, informatic framework, the specificity of which tacitly depended on a relativist sense of culture, even as it was driven by a universal cybernetic logic. Second, they had come to theorize "culture" as a human adaptation with a "life of its own," and were thus "after culture" in the sense of pursuing it as an object for their own study and explanation (they would thus encourage a view of culture as a form of artificial life and a practice of anthropology as Artificial Life science [Gessler 1994]). Playing anthropologist among these scientists required being "after culture" myself, drawing on the store of my discipline's ethnographic knowledge to query assertions about the universal "nature" of kinship and reproduction, for example, but also forcing myself beyond the limits of the culture concept to locate my subjects' activity in the power-saturated world of practice, discourse, and history—to read "against culture," as Lila Abu-Lughod (1991) has termed this strategy of refusing to see culture as a total, self-contained, coherent, and rule-bound dematerialized force.

When Artificial Life scientists understood their activity as "cultural," they reinforced the stability and unity of culture, even and especially as they sought to bend it back to examine itself; culture was fractally reproduced as a system of ideas at all scales.¹⁰ When I used "culture," however, arching it back to examine "science"—the seat from which anthropology had first generated "culture"—the thing began to snap; culture was fractured in my refractive observation

of its use among these scientists. The interference patterns that emerged revealed culture as a parochial representational tool, one whose seamlessness was often a sign of a lack (or excess!) of self-reflection among theorists who did not experience social reality as made of difference, polyphony, contradiction, and displacement—of worlds out of phase (Anzaldúa 1987; Gupta and Ferguson 1992; Rosaldo 1989). But if “culture” has not been disassembled for Artificial Life scientists, their organizing category of “life” has been. In this respect, Artificial Life has something in common with the reflexive anthropologies that queried the categories of “self” and “other” as well as the authority of ethnographic method and representation (Clifford and Marcus 1986). We might see both Artificial Life science and critical anthropology as enacting what Beck et al. have called “reflexive modernization” (1994), revising, even as they do not abandon, their attempts to describe a knowable world.

In *Critical Anthropology Now*, George Marcus asks whether the crisis of representation animating such statements as 1986’s *Writing Culture* has extended beyond the social science academy, and speculates that there have been parallel trends in “the professions, corporations, publishing, the military, finance, politics and policy, science and technology” (Marcus 1999:8; cf. Guillory 1993 for a reading of such crises as rooted in political economy, not in representation per se). Artificial Life grows out of a crisis of representation in Artificial Intelligence; practitioners see themselves breaking free of the notion that cognition can be symbolically represented, arguing that manufacturing machine minds will rest on modeling biology, even as they also hold that a biology based on simulation must draw attention to the constructed character of vitality and to the disciplinary politics of representation (Emmeche 1994; and see Maurer 1995 for a political economic account of the epistemological appeal of constructivist complexity). In their reflexivity, Artificial Life scientists are modernist kin to the anthropologists of science who emerged in the wake of anthropology’s “experimental moment” (Marcus and Fischer 1986) to examine the conditions of possibility for their own claims to scientific method and practice.

But such reflexivity has not come without a price for Artificial Life scientists, who, in their attempts at self-analysis have been seen by colleagues in the sciences of complexity as sabotaging their own project. When I returned to the Santa Fe Institute (SFI) in 1999 to give a lecture introducing my then newly published book, I found many previously skeptical researchers suddenly sympathetic to my analyses of the cultural valences of *Artificial Life*. But where some felt that an anthropological account had enriched their understanding of science as practice, others used my story to support their sense that Artificial Life had been contaminated by “culture” in a way their own fields—computational mechanics, for example—had not. It seemed to me that the science wars had folded back into the sciences of complexity themselves, with Artificial Life researchers now designated as suspiciously relativist in their constructions of the categories of both “life” and “science”

In "Steps Toward a Third Culture" Paul Rabinow (1996) suggests that critical social theorists take responsibility for knowing the state of play in such fields as contemporary molecular genetics and invite scientists into conversation that goes beyond post hoc discussions of "ethics" to engagements in deeper examinations of the modernities common to both science and the humanities.¹¹ This obviously entails scientists learning something about the categories of social theory as well—how we talk about institutions, power, meaning, and so on. Certainly, the Artificial Life scientists with whom I spoke were making efforts to undertake such dialogue. But while I might appreciate such engagement and ask that it be animated by more sociological savvy and cultural literacy from the scientists (something which might have helped avoid the stigmatization of those researchers with "more culture" at SFI), I am reluctant to make any grand statement about a "third culture" because it seems to me that the sciences and humanities are diverse enough that there can be no programmatic solution to setting the conversational terms. Nor is the issue simply the translatability of representations, as though these exist apart from institutional structures that allocate very different sorts of power and authority to their proponents. In the end, being "after culture" requires an attention to forms of life that materialize in densely intersecting circuits of power/knowledge. This is one thing that an inspection of the overlapping afterimages of "culture" in anthropology and Artificial Life can reveal.

Notes

Acknowledgments. I thank editor Dan Segal as well as two anonymous reviewers for *Cultural Anthropology* for helpful commentary on these reflections. I also thank Heather Paxson for useful suggestions at all stages.

1. Snow explicitly followed Malinowski in his formulation of science as culture, as Paul Rabinow points out in "Steps Toward a Third Culture" (1996). The stance offered in Brockman's *The Third Culture* (1995) operates less anthropologically and more superficially, simply announcing the hegemony of science.

2. According to David Hollinger, Snow had a similarly expansive estimation of the promise of the sciences, and maintained that science represented a politically progressive epistemology that humanists would do well to engage. Hollinger reports that Snow believed that "the scientific professions carried 'in their bones' a humane and democratic orientation toward the future" (1996:165).

3. See Helmreich 2000b.

4. Compare Diana Forsythe's (1993) account of her arguments with expert systems engineers over what might count as "knowledge" as well as Paul Rabinow's (1999) examination of the biographical trajectories and political commitments he partially shared with his biotech informants.

5. Though, to be fair, Kroeber actually takes great care in "The Concept of Culture in Science" (1952) to locate culture in a material world composed of organic and inorganic matter and energy.

6. Some contemporary anthropologists with training in cultural ecology have found Artificial Life techniques congenial to modeling social dynamics. J. Stephen Lansing has used computer simulations inspired by the sciences of complexity to model the dynamics of indigenous rice farming in rural Bali, rendering cultural practices in a

kind of feedback relation with nonhuman nature. He has presented his work at Artificial Life conferences to enthusiastic audiences (Lansing and Kremer 1993, 1994; for a critique, see Helmreich 1999; for Lansing's reply and my rejoinder, see Lansing 2000 and Helmreich 2000a). UCLA anthropologist Nicholas Gessler (1994) has been inspired by Artificial Life to create a computer model of cultural evolution named "Artificial Culture."

7. Casteneda's book occasions reflection on the relation between fiction and science, a distinction with which Casteneda plays, arguing that the world of hallucination is explicable through the categories of structuralist anthropology, a mode of analysis that assumes that culture is a self-referential system that derives its meanings from its own interior logic, which may or may not be meaningfully connected to any exterior or natural world. Scientific detractors from Artificial Life have sometimes accused Artificial Life simulations of being similarly self-contained and self-referential, without any necessary link to an empirical world. Both Casteneda and Artificial Life scientists have confronted skeptics ready to debunk their work as constructivist claptrap, if not outright hoax (see de Mille 1980 and Horgan 1995, respectively). Curiously, none of the scientists with whom I spoke knew of the attacks on Casteneda's work.

8. We might see Arturo Escobar as having begun just such a project when he called for an anthropologization of complexity, an appropriation by anthropology from within the language of complexity, a language Escobar reads as espousing a "pluralistic view of the physical world" allowing "connections and transgressions" (1994:222) between different ontological domains. I have been less optimistic than Escobar about the anthropological utility of the language of complexity, though, as I think on it now, his work may have been useful in opening up the dialogue suggested by the scientist who asked me to phrase my analysis in the idiom of Artificial Life.

9. Arturo Escobar (personal communication) has used this term to somewhat different effect. Escobar names as "technonature" such constructs as biodiversity, which exemplifies what Rabinow has termed "the infiltration of technoscience, capitalism, and culture into what the moderns called 'nature' " (1992:245)

10. If artificial life is, as Langton has written, "life made by *man* rather than by nature" (1989:2, emphasis added), and if culture is a form of artificial life, culture writes itself in a kind of autopaternity echoing enactments of masculine birthing in Artificial Life and pointing to the patrilineal impulse Catherine Lutz (1995) has discerned in the theorization of culture as a monolithic whole in traditional anthropology (see also Franklin 1995a).

11. See Heath 1997 and Rabinow 1999 for compelling examples of such conversations between anthropologists and life scientists.

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