

biome. Coevolutionary theories in the tradition of Gibson, Boyd, and Richerson and niche-constructive approaches (Sterelny 2003; Weber and Depew 2003) are founded on such correlations, working along feedback loops and feed-forward lines; Kockelman saturates them with signification. His *env-organism* is the playful avatar of coevolution. Its messages are: affordances are agents, agents affordances; the bond of the one to the other is semiotic; and discerning either is a question of framing and scale.

Technology. Another transposition: tools are signs, signs tools. Kockelman's linking of significance and selection asserts the immanent semiosis of technology—and reminds archeologists that hominin industries have *never not* been modes of storing and transmitting information.

Continuity. Kockelman's theory does not evade uniquely human aspects of biosemiosis and technocognition—fundamentally, the symbol and advanced mindreading (“theory of mind”). The capacity for joint attention is crucial to both (Tomasello 1999, 2008), and figure 7 suggests how it starts from the transposability of interpretant and sign in less elaborate communicative scenes. This linking of nonhuman and human is exemplary: Kockelman's approach again and again builds bridges across our customary chasms (nature/artifice, mind/body, thought/affect, etc.).

Emergence. The widening of the argument to sieving and serendipity links significance and selection to processes extending far beyond the biome. Kockelman discerns Deleuzian *abstract machines* (De Landa 1997, 2011; Deleuze and Guattari 1987): patterns in the emergent organization of flows of information (in the biome and its sociocultural outgrowths) and of matter/energy (in the multiverse as a whole). Figures 6–9 present schematics for these machines, each one building from the last to describe distinct semioselektive interactions.

What is the value of abstract machines in our analysis? First, they avoid transcendentalism and teleology. (Nietzsche glimpsed them in his will to power.) They are not opposed to matter, like Platonic ideas, instead describing immanent trajectories; to render them nonimmanent would be like attributing an idealized design to sodium transfer across a cell membrane. They generalize the dynamic patterns of matter/energy and information giving rise to complex assemblages, collectivities momentarily stable (at whatever scale), later dissolved into further flows.

In their generalization, abstract machines adduce sweeping commonalities behind the emergence of complexity of all sorts—their second methodological advantage. Kockelman demonstrates how a single machine can eventuate in a limitless range of (related) assemblages. Differences among these assemblages arise from the play in particular circumstances of the machines immanent to them; discerning the machines uncovers robust continuities of process. These carry broad evolutionary and historical implications, as a miniature case in point will suggest.

The final emergence of human modernity is today the most vexed question in hominin evolution. It has settled all too

often into a debate over the emergence of symbolism and its exemplary manifestation, language. This privileging of (linguistic) symbolism has encouraged bad habits: reductive proposals of single-cause selection for complex behaviors; assertions of radical discontinuities at odds with archeological and paleontological evidence; hypotheses of miraculous, symbolism-generating mutations; and even a certain “black-box” mystification of symbolism itself.

The best accounts, instead, have begun to introduce into evolutionary discussions the indexical entailments of symbolism and our deepening understandings of emergent self-organization (Deacon 1997, 2003). Kockelman's abstract machines point toward further work along these lines. This will connect ideas of emergent complexity (at scales ranging from neural nets to human populations) to the post-neo-Darwinian coevolutionary consensus mentioned above. It will avoid symbolo- and linguocentrism, revealing diachronic continuities between modern language and earlier communicative strategies. And, along the synchronic axis, it will uncover, around the Middle/Upper Paleolithic border, the relations of nascent language to several distinct capacities and behaviors of modern humans that are not narrowly symbolic: musicking, “offline” imagining of things beyond sense perception, and the transcendentalizing of social roles and institutions. In doing this, it will carry home Kockelman's lesson that human signification is tied to the broadest informational flows of the biome in ways our focus on symbolism has obscured.

Reply

Life Frames and Frames of Life: A Theory of Things, Including Media and Dreams

I want to thank the commentators for their extraordinary interpretants. I am sympathetic to almost all of their concerns, and only wish I had the space to do them justice here.

To start at the end, I am extremely grateful to Gary Tomlinson. His comments constitute perhaps the most sympathetic, careful, and expansive reading I can imagine. For example, he both tracks and synthesizes all of the different kinds of relations between relations outlined in the text (à la sec. 7 and fig. 9), and not just the two highlighted in the abstract (significance and selection). He foregrounds the way framing (sec. 4) may always creatively refigure and thereby potentially obviate the relations presupposed by any particular frame (and thus the reifications such relations are otherwise subject to). He effortlessly moves across a range of scales—phylogenetic, historical, interactional—showing important sites of intersection and intrascale. And he clearly and creatively ar-

ticulates a wide range of hidden connections, possible entailments, and conceptual allies.

Stefan Helmreich begins by masterfully summarizing a set of works with which this work may be put in conversation—for reasons of contrasting commitments (e.g., Agamben 2004 [2002]; Strathern 1995) as much as common cause (e.g., Gould and Lewontin 1979; Guyer 2004) as much as complicating and crinkling (e.g., Haraway 1991; Keller 2010). And he finishes by articulating what is arguably the dominant frame in both cultural and linguistic anthropology.

Putting this framing in its full generality goes something like this: (1) just as the social formations studied by anthropologists are historically emergent and particular, (2) so are anthropologists' epistemological formulations of those formations; (3) in part, this is because they too constitute a social formation; (4) in part, this is because both social formations are usually mediated, however unwittingly, by other social formations and epistemological formulations, which are themselves historically emergent and particular, at various degrees of remove; and (5) only critical theorists working at the level of, for example, Foucault or Marx are really ever witty enough to metaformulate such metaformations. (Okay, maybe Helmreich did not say all this, but he was getting at something like items 1–3, and I bet he would agree to 4 and maybe even accept 5.)

As both a linguistic anthropologist and an arch-Boasian (if only in certain measures and during certain months), I can surely sympathize. Indeed, not only is this often my preferred frame for undertaking analysis, it is also my preferred frame for analyzing my preference in frames. In particular, the claim at the end of section 4 is as follows: whenever we frame an event (entity, relation, process, etc.) as the outcome of significance and selection as much as sieving and serendipity, our framing of the event is itself the outcome of significance and selection as much as sieving and serendipity (not to mention all of the other relations between relations detailed in this essay). In this way, both the framing of the event (entity, process, relation, etc.) and the event so framed are historically emergent and particular and hence should be studied *in tandem* and *as such*.

Such moves hold for forms of life as much as life forms, not to mention that particular form of life that postulates life forms and that particular life form—us (and those, like chickens, with whom we are inextricably entangled)—that exist only as distinct forms of life.

Note, then, that my notion of framing is happily, and precisely, the “thickly historical term of art” that Helmreich rightfully calls for (but seems to overlook). Frames enclose as they disclose, reify as they reveal—and hence their reflexive centrality to this project (Kockelman 1999, 2007b). I hope this way of framing framing invites scholars to inquire into the aesthetics of such processes as much as their pragmatics (not to mention their epistemology and ontology). Thus, it is imperative that we substitute the word “frame” for “form” in the preceding paragraph. (Serendipitously, a recent acquaint-

tance of mine, Eben Kirksey, himself a coeditor with Stefan Helmreich of an important edited volume in cultural anthropology [2010], is, I would argue, our discipline's foremost curator of such frames.)

That said, I actually pointed to Nietzsche rather than Boas (and in particular, to genealogy rather than history, with its emphasis on descent rather than origins) as the most direct way to reframe the claims of this essay so as to be more compatible with certain commitments in cultural and linguistic anthropology. And James Faubion, in a very generous gesture, followed that point to another essay of mine that was written as a complement to this one: “Enemies, Parasites, and Noise: How to Take Up Residence in a System without Becoming a Term in It” (2010a). (See Coetzee's *Life and Times of Michael K* for an explanation of this subtitle; and see Kafka's *Trial* or *Castle* for an inverse icon of this explanation; i.e., how to become a term in a system without taking up residence in it.)

In particular, Faubion goes out of his way to read carefully that essay as well as this one and thereby defend this essay from possible misreadings—such as an overemphasis on closure. Moreover, he summarizes an important stance that he has detailed elsewhere (2011) regarding the utility and limits of various kinds of epistemological formulations and how the position advanced here relates to that one. Finally, on a pessimistic final note, he points out that rapprochement between the various subdisciplines of anthropology is unlikely. Fair enough, but I am with Gramsci on this one: pessimism of the intellect (I agree, they will never get it) and optimism of the will (but let us keep trying to give it to them).

In addition to directing our attention to some classic works in biosemiosis and the ways they relate to the present essay, Marcel Danesi foregrounds the relation between meaning and media as well as the relation between meaning and information. As he notes, these are large topics of central concern to many scholars and could be productively approached through the analytic framing offered here. I thank him for this invitation to say a few words about them.

This essay is precisely a theory of media in the wide sense (as that which mediates). In particular, any relation in figure 9 is such a site of mediation. In this way, this essay incorporates and extends more narrow senses of media (e.g., technological and/or aesthetic forms of mediation—à la film, radio, print, etc.). Indeed, if one takes selection (on any scale) to constitute function, and if one takes framing (of any scale) to constitute aesthetics, then the distinction between a wide and a narrow definition of media actually disappears. Most theories of “media,” as the very term suggests, are thus really theories of a handful of reified products of mediation.

All life forms—including that life form that exists only as forms of life—are simultaneously forms of mediation and media in formation (and maybe even vice versa, if only increasingly so).

None of this is to say that the narrow sense of media is not interesting. If I may invoke McLuhan for a moment and

limit my attention to the relations in figure 6, note the following. If a quali-sign is whatever could be sensed by a semiotic agent (and thus possibly stand for an object to that agent), a quali-interpretant is whatever could be instigated by a semiotic agent (and hence be created by a sign so far as it stands for an object). And a quali-object is whatever could organize the quali-signs (or sensations) and quali-interpretants (or instigations) of a semiotic agent: whatever could be a significant feature in the context of its selecting interests. From this standpoint, a key function of *media* in the narrow sense (from telescopes and guns to gloves and sunglasses, from telephones and the Internet to calculators and computers) is precisely to extend (as well as diminish, buffer, and mask) the sensory and instigatory capabilities of semiotic agents (as well as their communicative and cognitive abilities more generally). (Note, then, that earplugs, blindfolds, wet suits, skateboards, and handcuffs are media as much as gramophones, film, and typewriters.) They transform the quali-signs and quali-interpretants of semiotic agents and hence the quali-objects of semiotic agents—and hence the semiotic agents per se insofar as the features of such objects are so tightly coupled to the interests of such agents.

While Danesi's second important question also deserves an essay in itself, I am afraid I have only enough space for a slogan: *information is the enclosure of meaning* (where meaning is itself but one facet of mediation).

Zoe Crossland makes a very strong case for the relevance of significance and selection (and sieving and serendipity) to archeology and the study of materiality and networks more generally. And she offers a harsh critique of ANT as working on a structuralist model of semiosis. Her own work (Crossland 2009, 2010) is exemplary of several of the commitments of this essay and stands at the forefront of efforts to theorize materiality through the lens of mediation.

I myself am a big fan of much of the work by Serres, Callon, and Latour, and I have tried to show some of the ways this project resonates with theirs while, nonetheless, having different roots and ultimately bearing different fruits. In particular, the essay mentioned above (Kockelman 2010a) goes to what I think is the heart of the connection between Serres and Peirce on the one hand and ANT and this project on the other. And two other essays—"Agency: The Relation between Meaning, Power, and Knowledge" (Kockelman 2007a) and "Enclosure and Disclosure" (Kockelman 2007b)—track some of these connections as well. For these reasons, I am not going to take up here Crossland's invitation to reflect on ANT and the study of science and technology more generally.

As for the term "agent," I certainly understand where Crossland is coming from, and hence I understand why some theorists have coined new terms or unmoored old terms from canonical meanings. My sense is that defining one's term carefully in relation to a field of other carefully defined terms is the best way to stave off possible misinterpretations. And so I want to emphasize with Crossland that the way the term "agent" is defined and implemented in this essay should en-

sure that properties such as free will, subjectivity, cognition, and so forth are *not* presumed.

Rather, "agency" is a wide term defined in relation to objects on the one hand and signs and interpretants on the other; where any bundling of all of these, qua envorganism, gets its value only in relation to a world or *-verse* of other envorganisms; and where all of these relations, so far as they are the projection of a particular framing, are themselves already subject to the demands of enclosure. Figure 9 is an attempt to frame all of this at once.

Moreover, such relations between relations are fundamentally rooted in "selection"—a term that is meant to range over a very wide set of processes, some of which look quite a lot like classic notions of free will (qua intentional actors selecting instruments and actions on interactional timescales with potentially huge amounts of freedom and foresight); some of which look like sieving in combination with serendipity; some of which look like the circumspection and association, or the *umsehen* and *umgehen*, of Dasein-like entities; and some which do not look like any of these at all.

The agents (or envorganisms) in question are fundamentally widely distributed, multidimensional, and by degrees notions—only sometimes coinciding, under certain framings, with stereotypically agentive entities—such as animals, people, instruments, environments, cultures, and life forms. In particular, our attempts to designate "agents" are usually only quixotic efforts to enclose *agency*, which really only ever exists, as it were, in the wild, outside of any frame, in ways that are as murky, fleeting, and distant as the modes of mediation that constitute it. That said, the temptation to move from agency to agents or mediation to (im)mediators will always be great, for they allow one to treat the agent at issue as a *unit of accountability* (Kockelman 2007a, 2007c) in all of its extended senses—not only that which is responsible but also that which is worthy of an account, a locus of selection, and potentially quantifiable.

Vincent Colapietro's incredible writings played a large role in piquing my interest in and shaping my understanding of Peirce. And his specific remarks as to the relative ethnographic rootedness of my analysis in this essay are fair and dovetail in certain respects with those of Helmreich. So, to show the way my concepts are empirically rooted and ethnographically imagined, I need to go to another text, written in another register, and itself the benevolent triplet of this one: "A Mayan Ontology of Poultry: Selfhood, Affect, Animals, and Ethnography" (Kockelman 2011). This essay foregrounds several of the relations between relations discussed in this text as they unfold on historical and interactional scales. In this way, I hope it provides what Colapietro beautifully characterizes as "a more concrete sense of our inextricable entanglements and a more lively sense of the unfinished character of the natural processes and human practices in which human and allied actors are ineluctably caught up."

Finally, in contrast to the foregoing respondents, some of the comments by Olivier Morin and Christophe Heintz read

relatively carelessly and thereby miss most of this essay's arguments. The last part of section 3 is precisely a reading of Grice and ostensive-inferential communication more generally. In particular, it explicitly frames Grice's claims through the categories of Peirce and thereby synthesizes two of the most powerful approaches to meaning of the last century. Indeed, the only way I can understand how their comments went so far awry is to assume that they read this essay only in light of what they were expecting to find and then stopped reading at the end of section 2. A pity, really, because this essay is, in part, meant to leverage both kinds of approaches and thereby bring together both sets of practitioners. Serious scholars working in a neo-Gricean tradition (Levinson, Sperber, and Wilson; Tomasello; inter alia) will find a lot of common ground.

So let me turn lemons into lemonade. In particular, the aforementioned section of this essay is in some sense a generalization of Grice-like ideas where the dynamic object (or "communicative intention") in question need not only be evinced in human agents on interactional timescales. For example, one way to playfully reread the Freudian oeuvre is to reframe repressed wishes as a kind of dynamic object; such a dynamic object relates to a dream (parapraxis, neurosis, etc.) as cause to effect, where the dream itself has an immediate object (whatever it most transparently points to—e.g., the manifest dream content), and this object itself constitutes a sign of a more mediate object (the latent dream content)—which can be inferred only by reference to the dynamic object (repressed wish) that set the whole process in motion.

More generally, the immediate object of any sign can itself constitute a sign of a more mediate object that is itself only easily attended to (by an interpreting agent) by reference to the dynamic object (or original cause) of the initial sign. In this wide framing, "ostensive-inferential communication" of the Gricean sort is very similar to "psychoanalysis" of the Freudian sort—a fact that is destined to be repressed by neo-Griceans. Such a rich account of interpretation, suitably re-framed, is perhaps Freud's most prescient and lasting contribution.

—Paul Kockelman

References Cited

- Agamben, Giorgio. 2004 (2002). *The open: man and animal*. Kevin Attell, trans. Stanford, CA: Stanford University Press. [SH]
- Agha, Asif. 2003. The social life of cultural value. *Language and Communication* 23(3):231–273.
- Anscombe, G. E. M. 1959. *Intentions*. Oxford: Blackwell.
- Aristotle. 2001. *Nicomachean ethics*. In *The basic works of Aristotle*. Richard McKeon, ed. Pp. 935–1112. New York: Modern Library.
- Atran, Scott. 2002. *In gods we trust: the evolutionary landscape of religion*. Oxford: Oxford University Press.
- Austin, J. L. 2003 (1955). *How to do things with words*. Cambridge, MA: Harvard University Press.
- Bakhtin, Mikhail. 1986. The problem of speech genres. In *Speech genres and other late essays*. Pp. 112–145. Austin: University of Texas Press.
- Barbieri, Marcello, ed. 2007. *Introduction to biosemiotics: the new biological synthesis*. Dordrecht, Netherlands: Springer. [MD]
- Bardini, Thierry. 2011. *Junkware*. Minneapolis: University of Minnesota Press. [SH]
- Boyd, R., and P. Richerson. 1985. *Culture and the evolutionary process*. Chicago: University of Chicago Press.
- . 2005. *Not by genes alone: how culture transformed human evolution*. Chicago: University of Chicago Press.
- Boyer, Pascal. 1994. *The naturalness of religious ideas*. Berkeley: University of California Press.
- Brandom, Robert. 1979. Freedom and constraint by norms. *American Philosophical Quarterly* 16:187–196.
- . 1994. *Making it explicit: reasoning, representing, and discursive commitment*. Cambridge, MA: Harvard University Press.
- Brown, Penelope, and Stephen C. Levinson. 1987. *Politeness: some universals in language usage*. Cambridge: Cambridge University Press. [OM, CH]
- Burnett, D. Graham. 2007. *Trying leviathan: the nineteenth-century New York court case that put the whale on trial and challenged the order of nature*. Princeton, NJ: Princeton University Press. [SH]
- Cavalli-Sforza, L., and M. Feldman. 1981. *Cultural transmission and evolution: a quantitative approach*. Princeton, NJ: Princeton University Press.
- Cheney, Dorothy L., and Robert M. Seyfarth. 1990. *How monkeys see the world: inside the mind of another species*. Chicago: University of Chicago Press.
- Clifford, James, and George E. Marcus, eds. 1986. *Writing culture: the poetics and politics of ethnography*. Berkeley: University of California Press.
- Colapietro, Vincent M. 1989. *Peirce's approach to the self: a semiotic perspective on human subjectivity*. Albany: State University of New York Press.
- Crossland, Z. 2009. Of clues and signs: the dead body and its evidential traces. *American Anthropologist* 111(1):69–80.
- . 2010. Materiality and embodiment. In *The Oxford handbook of material culture studies*. D. Hicks and M. Beaudry, eds. Pp. 386–405. Oxford: Oxford University Press.
- Csibra, Gergely, and György Gergely. 2009. Natural pedagogy. *Trends in Cognitive Sciences* 13:148–153. [OM, CH]
- Darwin, Charles. 1965 (1872). *The expression of the emotions in man and animals*. Chicago: University of Chicago Press.
- . 1981 (1871). *The descent of man, and selection in relation to sex*. Princeton, NJ: Princeton University Press.
- Davidson, Donald. 1984. *Actions, reasons, and causes*. New York: Oxford University Press.
- Dawkins, Richard. 1976. *The selfish gene*. Oxford: Oxford University Press.
- Deacon, Terrence. 1997. *The symbolic species: the co-evolution of language and the human brain*. London: Penguin. [GT]
- . 2003. The hierarchic logic of emergence: untangling the interdependence of evolution and self-organization. In *Evolution and learning: the Baldwin effect reconsidered*. Bruce H. Weber and David J. Depew, eds. Pp. 273–308. Cambridge, MA: MIT Press. [GT]
- De Landa, Manuel. 1997. *A thousand years of nonlinear history*. New York: Zone. [GT]
- . 2011. *Philosophy and simulation: the emergence of synthetic reason*. London: Continuum. [GT]
- Deleuze, Gilles, and Félix Guattari. 1987. *A thousand plateaus: capitalism and schizophrenia*. Brian Massumi, trans. Minneapolis: University of Minnesota Press. [GT]
- Dretske, F. 1981. *Knowledge and the flow of information*. Cambridge, MA: MIT Press.