Paul Hansen

# Fuzzy Bounds: Doing Ethnography at the Limits of the Network and Animal Metaphor[1]

**Introduction.** My ethnographic fieldwork has primarily focused on animal-human-technology relationships. From 2006 I have researched industrializing dairy farms in the Tokachi region of Hokkaido, Japan; from 2009 I have conducted research on human-canine relationships in urban Japan, mostly in Osaka and Tokyo; and from 2014 I have done comparative research on these themes in urban and rural Jamaica, Kingston and the Parish of Saint Thomas respectively.[2] When focusing on animal-human-technology relationships, one is eventually drawn into contemporary discussions of Actor Network Theory (ANT), and by extension, Science and Technology Studies (STS).[3] Today, ANT and STS are fairly common territory for a range of social scientists and humanities scholars. These schools of thought influence the way researchers engage with their chosen disciplines or interact interdisciplinarily, and how they approach various topics of inquiry. As an anthropologist engaged in long-term ethnographic research, my roots firmly grounded in inflections of *anthropos*, finding myself ever-drifting towards conceptions of the posthuman, the nonhuman, more-than-human publics, and other contemporary schools of thought that point beyond the confines of human subjectivity and social structuring is liberating, but also disorienting.[4] In light of these theoretical concerns, in this paper I argue that a move away from the comfort zone of "network" and "animal" as "conceptual metaphors" (Lakoff and Johnson 246-249) is needed in any ethnographic descriptions or analysis of agency of a sentient more-than-human kind. To be clear, this is not to propose that we abandon the concepts of network or animal *in general*, but that anthropological ethnographers *in particular* need to be ever-aware that they focus on the specific, interactive, historically situated, and developed capacities and potentials of extra human worlds. "Being there," or the practice of long-term ethnographic fieldwork, opens the researcher to constantly unfolding idiosyncratic engagements — or one could say "becomings." Thus, when one returns, "comes back" from "the field" and all the distancing that language implies, care should be taken not to succumb to reductionist descriptions and explanations that glaze over the existential anomaly experienced. On return, there is always an impetus to purify or sanitize events in order to sentimentalize, essentialize, and generalize findings, making them easier to write up and read. For field data to have any validity, this should be avoided.

**What's in a "Cow?"** The notion of existing ever-between "being" and "becoming" (or "analyzing" and "engaging," in terms of fieldwork practice) is essential to what follows. Holism is an idea and ideal central to anthropology from its modern foundations. And as such, reduction is a reoccurring problem when doing anthropological ethnographic research and writing on the intersections and interconnections of humans, non-human animals, technology, plants, ideas, beliefs, and values. What links or divides disparate entities is seldom experienced as a set, let alone multiple sets, of flat or evenly balanced relationships for either ethnographers or their interlocutors, human or not. This is because interactions are imbued with differing degrees of, and potentials for, embodiment, intimacy, immediacy, and agency. Moreover, even co-animated interactions can be vague and affect saturated exchanges. For example, a cow is not a human. This is simple to argue, and with a bit more persistence in argument it is clear that a cow cannot be just any cow, a cow in the general singular.[5] In short, every cow that one comes in contact with must be regarded, and is certainly experienced, as a particular presence — a significant other — in a particular place and context.[6] But what, exactly, is the experience of the ghost (*yūrei* in Japanese) or soul (*tamashi* in Japanese) of a cow? How does "it" — or indeed does it? — differ from encountering another ghost, for instance the specter of another human, or an inanimate apparition, say of a house?

During an interview with a north-central Hokkaido dairy farm owner, I was told that bovine spirits compelled him to erect an exceedingly expensive *chikukonhi* (livestock funeral monument). Moreover, to appease these entities and to keep them from bringing misfortune to his business, he also attends and pays handsomely for annual Buddhist funeral services to be conducted for the *tamashi* of cows — entities which he personally experiences as greenish blue dancing lights. I have known this man for 10 years, and while he certainly is an anomaly in his community, it is not because of his engagement in these practices or metaphysical beliefs. Many local farmers have told me nearly analogous stories of "hauntings," and they participate in similar rites — albeit the lion's share of them far more half-heartedly. Indeed, such funerary rituals, explanations, and justifications are common across a range of human-nonhuman relationships in Japan (see Ambros). However, this farmer stands out due to his other idiosyncratic engagements in the community. He is the owner of the largest and most fiscally productive dairy farm in the area, one on the technological cutting edge — for better or worse being another issue — of dairy farm industrialization. He is thus a self-proclaimed pioneer, a highly rational, hardnosed, business-first agriculturalist, who looks to cut costs wherever possible and guffaws at numerous traditional, regional, and co-operative customs. Yet concomitantly, he is tormented by what remains unseen to

many. And he is more than willing to spend money on rituals to pacify these intangible, but nonetheless influential, indeed agentive, experiences and/or things.

Clearly, the questions and answers a researcher might produce regarding networks or agentive being in this example are not simple. Who or what is motivating these acts? Is it the farmer, the living cows, the bovine ghosts, or the company that builds the monuments? Further, how are they linked? Do we sagaciously point a finger toward *the social* or a shared a belief system as the root cause? Or, perhaps less precisely, the answer is to be found in one of the regular Neo-Marxian alibis; perhaps it's the economy or even *habitus* that impels these seemingly contradictory actions. Moreover, are the souls or spirits encountered other-worldly interveners (things in and of themselves) in human-bovine relations? Or are they this-worldly, human-only experiences that lead to local, rationally calculated costs of doing business? How does one balance the influence of personal guilt or social pressure?

In this case, I know from years of ethnographic experience that no other farmers in the area are as stalwart in their ritual actions as the man described above. Nevertheless, however one cares to explain the connections, cutting production costs with a market-first mindset and then spending the savings to appease bovine spirits seems paradoxical, given the neoliberal context of contemporary agribusiness, whether in Japan, Jamaica, or presumably Jersey or Jordon. Perhaps one can most accurately say that all of these things are working in concert: holism and functional anthropology redux. And if so, a problematic question follows. Do they influence equally? Should we think of this constellation — human and not human, from beings to things, ever-becoming and co-constituted of radically different essences — as a network? And again, if so, do such relationships and processes of functionality start to become fuzzy and unclear, or even fail, at a differing levels of analysis? How do we then account for the various components, *agencies*, or *actants*, especially ones that are clearly sentient and even have distinct personalities? Putting all this in plain terms, when is a cow singular and experiential — as in, my cantankerous cow Betsy who seems to intentionally step on my toes when milking? When is it plural and abstract — for example, a cow is a milk producing bovine being with four legs and four stomachs? What is clear is that *the/a* cow can be both in differing contexts and from differing perspectives. The question of squaring context and experience is not a new dilemma in anthropology, nor are the questions surrounding the experiences and analyses of ethnographic encounters.

**Of Ethnography and its Particulars.** From Evans-Prichard's explanations of the logic behind Azande Witchcraft to Alan Young's more recent discussions of the creation of PTSD as clinical category, notions of shared "epistemic cultures" underlie socio-centric

explanations of motive and experience. Yet, such shared logics are not sufficient to explain singular or individual actions and interpretations which are at odds with "common sense."[7] Confronting such seeming incongruity is at the core of anthropology as a discipline. Alfred Kroeber was a central figure in the cultural anthropology method and theory debates of his day. His pithy and oft cited description of anthropology as "the most humanistic of the sciences and the most scientific of the humanities" is as fitting today as it was nearly 100 years ago.[8] One could add other binaries to the mix. Do we favor the explanatory power of the social over the individual, focus on structure or agency, grapple with human particularity or give more weight to our commonality with other animals? Explanations of value and motivation in anthropology (including those of the ethnographic research process itself) make it an unlikely candidate for a purely positivistic science with clear premises, let alone conclusions. Yet, these often intangible aspects of value and meaning clearly exist and they remain existential experiences that anthropological ethnography as "full bodied" or "sensuous" scholarship must grapple with.[9]

My point is more precautionary than critical. I suggest that the concept of "network" and the definition of "human" in opposition to "animal" are essential ideas from a macro *perspective*. They go a long way towards understanding *human social structures*, like industrial farms or dog friendly parks, in that they effectively bracket lived complexity so that generalized explanatory models can function. As such, the focus on human social structures is part of a widely shared epistemic culture of *common* social scientific explanation. I will return to the logic of *human social structures,* but what ought to be apparent even from the example of the cow and farm owner above is that these conceptualizations often break down during ethnographic encounters if retained in an inherently macro oriented context.

Put bluntly, the *human social structures* of many social science studies have a less discussed flipside that I will call *more-than-human individuated agencies* (hoping that this somewhat pedantic binary label captures something more of the singular and experiential nature of the everyday and ethnography). Fieldwork experiences, for informant or researcher, are often poorly understood through the abstracting and pluralizing metaphors of network and animal. This is notably the case in encounters where differing *umwelten* or enviro-worlds are at stake: telling, for example, is the above account of a particular farmer, a particular experience, and particular cows on a particular farm. There may well be similar experiences, but they are not the same experience, and the purpose of ethnography, and this is *a key if often forgotten point*, is to participate, observe, and account for the particular and not to buttress preconceived

generalizations.[10] This is not to say that one cannot, after the fact, generalize from these particulars. But for ethnographers who hope to engage with and add to the explanatory potential of posthuman, multispecies, or even cosmopolitan theory, they must do so being attentive to what they are engaged in first and foremost: the particular, affect saturated, and embodied relationships they are privy to via both participating in and observing the lives of others over time and firsthand.[11] To be a part of *umwelten* or being-in-the-world is always plural, shared, and not singular. This notion of "shared worlds" is currently a highly popular social theory perspective, but at the same time it is important for anthropological ethnographers to keep in mind that living (and their research experience, for that matter) is an inherently individuated and idiosyncratic experience, an existential condition that ought to be understood and respected in ethnographic writing.[12]

Translating such inimitable experiences (beings ever becoming) to others (an audience, occasionally very eclectic and catholic in their interests and tastes) about *Others* (capital O, our interlocutors — animate or inanimate) is always incomplete and imperfect. Moreover, in our idiosyncratic everyday encounters, agency is never distributed equally amongst the pantheon of agencies experienced. More to the point, networks are seldom experienced, let alone understood, as complete. In what follows, theorizations of an embodied and ecological *umwelten* primarily stem from three sources: the work Jakob von Uexküll, Kinji Imanishi, and perhaps most notably Tim Ingold. In support of this conceptualization, I focus on ethnographic descriptions of two contemporary and increasingly common dairy farm practices that involve complex interconnections of bodies and animal-human-technology: rotary dairy parlor milk production and the process of AI or artificial insemination.

**Fuzzy Bounds: More-than-human Experiences, Contingency and Vagueness.** We live in a world of increasingly complex "partial connections,"[13] often untraceable, in accounting for human or nonhuman agencies. *Fuzzy Bounds*, the title of this article highlights the polysemy of experience in living with a myriad of other beings past, present, and continuous tense entwined.[14] First, fuzzy is a somewhat childish way of saying furry — such as the hair of a variety of animals from humans to bears. And here too, sentient or not, real or teddy, experience is participatory, particular, and often tactile. Fuzzy in this sense obviously connotes the hands-on experience of engaging in common human-nonhuman interactions: farmers milking cows, park walkers with dogs, children and their favorite bedtime partner/stuffed guardian. However, the word fuzzy also has a second meaning, something more distant, cerebral and visual. It means vague or unclear, for example the beginning and end of physical boundaries as viewed in fog or during twilight. This metaphorical definition suggests an observational as

opposed to a participatory vagueness. What we *observe* in terms of these nonhuman examples can be both a distant *animal* or an anthropomorphized friend or family member. Encounters with dogs or cows can be engagements with fuzzy Others in both senses, depending on context. This is surely because many domesticated mammals are differently, but nevertheless comparatively, embodied with humans. Our close connections with these beings, physically and affectively over evolutionary time or even over a single life history, are relationships that are unclearly understood *in general*. That is to say, conceptualizations of a general *animal other* shift; dogs, in general, can be one person's fuzzy friend, another's fuzzy foe, and yet another's fuzzy food.

As underscored by Kroeber's aforementioned definition, the fuzziness of bounds is also a problem particularly rooted in the schizophrenic nature of anthropology itself: the act of articulating *participant observations*. This is a point brilliantly expanded upon by Tim Ingold in a chapter entitled "Anthropology is not Ethnography" (see Ingold 229-243). Augmenting Kroeber and Ingold, we can borrow from anthropologist Victor Turner to conceptualize anthropology itself as a discipline of constant methodological and theoretical liminality (see Turner). On the one hand, anthropologists are pragmatic scientists. They are experience-oriented and embodied field researchers. They are existential data gatherers, even *accountants* of socio-cultural environments and conditions. On the other hand, anthropologists are also educators and writers expected to communicate these findings in a largely shared, if occasionally opaque, theoretical and stylistic *lingua franca*: a theory-savvy ethnographic text. They usually communicate findings and ideas to other anthropologists, social scientists, or neophyte researchers, seldom the general public. Thus, alongside being cultural accountants, anthropologists are theoreticians or *applied philosophers* rooted in social and cultural data. Yet any such binary necessarily collapses into a betweenness — accounting the particular in some generalizable way. In reality, even a moderately successful anthropologist compacts these dual roles into what often seems an uncomfortable discipline, the fuzzy discipline of socio-cultural anthropology. One aspect of research over the other might well be preferred by a given anthropologist; viewing oneself as a better fieldworker than the socio-cultural commentator or vice versa. Nevertheless, navigating this liminal space is the alchemy of effective anthropology — one does raw data collection and via these particular experiences one can then theorize, generalize, reduce, and compare, hopefully with some evocative and imaginative élan. This is how the "being with" singular beings and witnessing their becomings over time forms the data that then must be actively and creatively morphed into an *accounting for* a general subject and *accounting to* a general audience.

Yet, I suggest that it is in this exact contraction, in the vague parameters of *doing* and *theorizing*, that anthropology reaches a limit (or an impasse) as to how deeply the ethnographic element of the discipline can remain committed to modes of abstract macro-oriented discourse. This is especially the case when paradigms and accompanying jargon are assumed to be widely shared inside, let alone outside, anthropology. At the risk of putting a core question too simply, how far can the social, general and largely visual metaphors of *network* and *animal* go in describing the particular, embodied and multi-sensual human and non-human relationships and enviro-worlds of embodied experience? For example, for a farmer, what might the claim that "an animal or a piece of farm equipment is an 'actant' or has agency within a network" mean? Furthermore, combining the term "social" — a common macro-level signifier—with network or animal is even more redundant and misleading.[15] Taking the already anthropocentric framing for granted, is there an un-social network or a non-social animal?

Again, I do not claim that the terms "network" or "animal" should be replaced with new and improved universal markers.[16] This is unabashedly what anthropologist Tim Ingold does do in using the "meshwork" as a conceptual replacement for network (Ingold 62). Given that I too do anthropology, I am happy to follow down his path in terms of my own ethnographic work, but as a social scientist my general claim must be far more modest in scope. Much as Geertz outlines in his essay "Anti Anti-Relativism," the focus is a matter of balance and not exclusion. Utilizing fieldwork experiences, in what follows I argue for the greater explanatory potential of conceptualizing networks *alongside* or in tandem with living meshworks and the need to account for agents or Latourian actants (from a fellow living being, idea, apparition, building, etc.) as specific, and so historically situated, things and beings with individual capabilities, capacities, and thus, particular life trajectories and "potentials" in terms of micro encounter.[19] Even acknowledging more-than-human *personhood* as opposed to animal, or general categories of animal, is more illuminating in some cases with sentient nonhuman others. Meshworks allow ethnographers to say something about experiences that networks, even in a revamped form, cannot. Thus, my prescription boils down to a largely Socratic one: know thyself and subject as a researcher. Question your position and relations beyond a human-centric viewpoint as a researcher/writer. If network and animal alone suit your purposes as a social scientist, then use them. But in terms of ethnographic description there are alternative and more intimate, if less popularly discussed, options with the meshwork concept, remaining true to particularity perhaps chief among them.

**Flattening and the Problem of Hyper-Potential.** Augmenting arguments made by Ingold and Sismondo, I contend that the concepts of network and a general descriptive noun like animal are too fuzzy (that is to say imprecise) to discuss our changing relationships with many fuzzy others or nonhumans on an experiential level. Even on a macro level, unrestrained focus on network or actant can become exceedingly complex, as noted below, but that is not at issue here. These concepts, when shoehorned into micro level analysis, render individual animated relationships vague, depersonalized, and even intentionally depoliticized and devoid of history.[20] And as such, they can quickly become misleading terms when dealing with fuzzy others and interactions experientially, that is, ethnographically.

The easiest way to view this problem is to account for sentient fuzzy agents first. This maneuver is not to dismiss cow ghosts or teddy bears as unimportant, but to hone in on the notion of particularity in regard to Otherness and agency, as opposed to generality or essentialism. The process and use of ethnography itself is part of the issue here. In anthropology the question of reflexive positionality is important. Who is doing what to whom and why? Moreover, as *anthropos* implies, with few exceptions, in the final analysis the focus of the discipline has largely been on relations of human animals. I will suggest, as have an increasing number of ethnographers, that this be extended to "person" in reference to those fuzzy others who are now often referred to as animals.[21] But I am not willing to avoid people, more exactly particular and encountered people, in ethnographic representation. Outside of anthropology there are, of course, other forms of social science enquiry that also use ethnography as a research tool, but I suggest that the focus of such research is often on the question *how* followed by *who*? How did/does this happen and who or what is responsible? The difference between *anthro*pology (on the whole, and prioritizing ethnography) and, say, ANT or STS (as interdisciplinary, and again, on the whole) is the way a researcher starts to ask questions. Does a researcher start with asking *who* and then ask why, or do they start with asking *how* and then ask who? The following examples highlight that where they arrive from that starting point can be quite different.

Bruno Latour is trained as both an anthropologist and sociologist, and from the inception of ANT he — despite being one of the founders of what could now be called a paradigmatic form of social science theorization — has had an uncomfortable relationship with the label ANT. Indeed, in a telling article, "On Recalling ANT," Latour begins with a rather jarring and well-known statement: "I will start by saying that there are four things that do not work with actor-network theory; the word actor, the word network, the word theory and the hyphen! Four nails in the coffin" (15). This

sounds like a rather damning dismissal, yet despite distancing himself from some aspects and uses of ANT terminology in 1999, in a 2013 book/online project we find the network metaphor remains troublesome, an unshakable ghost perhaps. In this work he offers two revamped meanings of the network concept.[20]

His first usage of network as a general-register concept is essential in any discussion — for example, a computer network or product distribution network. This use of network is, for the case at hand, unproblematic, as it indexes existing and traceable material connections, links that are to a large degree repetitive, generalized, and reductive. This is an accepted part of social science theorization. However, a problem arises with how Latour defines network in a second register. His stated goal is to get at values, guiding principles that do not respect modern modes of boundary classification, as, for example, law, science, or religion are all replete with shared values. And following the ways values "translate" across what are perceived as discrete bounds is at the core of his revamped, second order, micro oriented network concept. What he now calls [NET] to distinguish this process from the prior notion of network is

> [a] principle of FREE ASSOCIATION — or, to put it more precisely, this principle of IRREDUCTION — that is found at the heart of the actor-network theory … [authorizing] … observers to give themselves as much freedom of movement in their studies as their informants have… (An Inquiry 33-34)

This reframing is useful in highlighting connections of process, the linkages of *how?* For example, this operation stresses how values permeate heretofore accepted institutional domains and seem to possess agency in themselves. Yet, [NET] remains too fuzzy for communicating experiential and embodied (*in situ*/situated) relations, personal relations, and relations of persons — the *who?* and *why?* Again, this is a matter of the starting question and where one wants to end up. Latour correctly highlights that this latter incarnation is full of research potential, it is brimming over with it in fact. But that is precisely the problem in terms of anthropological ethnography. In this account there are no actual people who *hold* values, there are "the moderns" and a fictional ethnographer trying to understand their values through various material processes and relations; actual persons, individuals having or expressing *their* values, are absent. This claim requires elaboration.

Couched in his larger example of a fictional researcher used as a stand-in for a contemporary ethnographer researching "the moderns," Latour offers the following example to trace the [NET] of gas transmission when cooking risotto is unexpectedly

interrupted. The irreducible linkages of gas from Russian oil fields to cooking in an apartment in France is traced beyond bounded spatial or material domains.

> The natural gas that lets the Russians keep their empire going does circulate continuously from gas fields in the Caucasus to gas stoves in France … [where, in his example, gas flow has inexplicably been interrupted while cooking a meal] … but it would be a big mistake to confuse the continuity of this circulation with what makes circulation possible in the first place. In other words, gas pipelines are not made "of gas" but rather of steel tubing, pumping stations, international treatises, Russian mafiosi, pylons anchored in the permafrost, frostbitten technicians, Ukrainian politicians. (32-33)

From the start, and likely shocking for many an anthropologist, is the rampant essentialism here. Leaving aside "the moderns," who are the "the Russians?" Which frostbitten technicians? What "Ukrainian politicians" in particular? These would be the first-order questions in anthropological ethnography. And indeed, doing long-term fieldwork among any of these groups, it seems reasonable, at least to me, that some people would be capable of highlighting what values they hold dear if asked. Further, they would be capable of seeing, and willing to see, how values *bleed* across a variety of permeable institutions. But there is a creeping contempt in the text for extracting any notion of *personal* values from *informants.* Our seasoned ethnographer is careful to "avoid giving their explanations too much weight," and " [a]lthough her informants are obviously attached to these distinctions, [between discrete categories like science or law] … she comes to understand very quickly (a few weeks spent doing fieldwork or even just reading newspapers, will have sufficed to convince her) that with these stories about domains she is being taken for a ride …."(28-29). One can surely witness values reflected across a range of institutions through their material processes, but the ethnographic mission is to uncover who and why people hold these perspectives. At least this is the goal of micro oriented ethnographic fieldwork.

Indeed, if one could actually trace it, the gas [NET] example is really a macro network of Holy Grail stature. In such an *anything goes and everywhere links* constellation of network — that is, seemingly ceaseless networks in the plural — agent alongside agency in a micro, individual, or at least individuated, sense becomes too vague to work with. In what follows, I will outline how the more macro network concept (or animal, even the more specific Holstein cow) cannot be utilized to deal with

ethnographic — that is to say particularistic, historical, and indeed individual — interactive human and non-human relationships.

**Metaphoric Milking and its Limits.** Depending on the time of year it can be 30 degrees above or 20 degrees below in Tokachi, Hokkaido. Given this climate, the northern Tokachi landscape, both natural and human-made, stands out in the context of Japan. For example, it clearly contrasts with the rather temperate region of Kanto, where the capital city of Tokyo is located, let alone tropical Okinawa further south. Hokkaido as a whole comprises 22% of the Japan's landmass, while it is home to less than 5% of population. Tokachi is the largest sub-prefecture in Hokkaido, yet the capital city Obihiro is home to less than 200,000 people. There are, perhaps more tellingly than these spatial statistics, more Holstein cows than there are people in Tokachi. The closest rail station to my field site is almost 40 kilometers away, a situation unimaginable in much of the nation. Land, in relative financial terms, is cheap, because Tokachi is expansive and not agriculturally productive much of the year. And these are only fragmented details of the many other particularizing shared macro features of the physical and social environment, specific factors that clearly impact ethnographic encounters, whether with other humans or non-human agents.

Over the last generation there have been significant shifts in Hokkaido's dairy industry.[21] Single-family owned dairy farms have rapidly given way to industrial joint-share companies. This outlines a myriad of issues in global agriculture practices too numerous to enumerate in this paper.[22] For the case at hand it means that in order for Japanese consumers to only pay double the world market price for their milk, there has been a rapid reduction in the number of single-family owned and operated dairy farms and a concomitant increase in the size and joint ownership of remaining dairy farms. Since 1999, the size of an average Hokkaido dairy farm has increased (currently to about double the national average, with around 120 cows per farm), while the number of farms has decreased.[23] As the number of cows rises, the financial overhead, such as loans, leased land, and workers from outside of the family, community, and country also increase. Concomitantly, the number of dairy farm operations, counted for example through farms with government issued milk quotas, has steadily declined. In sum, there has been a rapid and radical industrialization of dairy farming, and this necessitates two related shifts in terms of human-cow-technology relationships: the need for rotary parlors and the need for AI (artificial insemination).

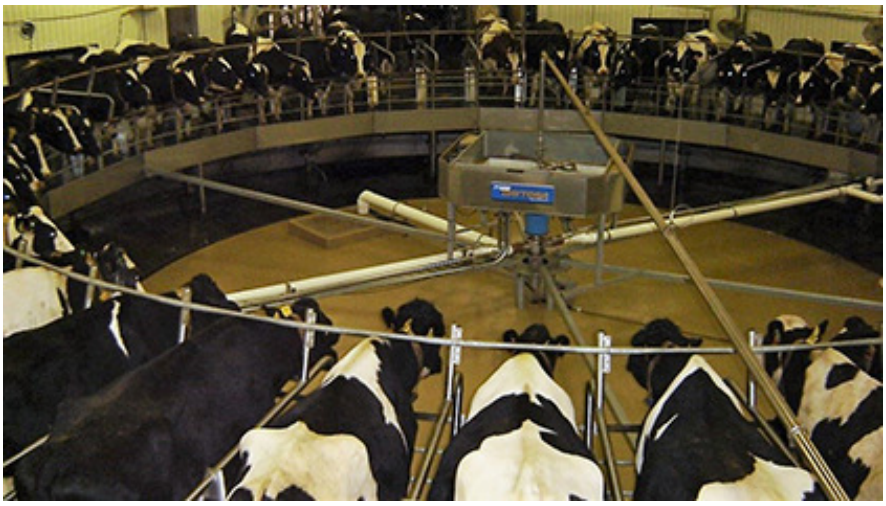

**Figure 1: Bird's Eye view of a Rotary Parlor. (Photo by author.)**

For a year I worked as a hired hand on a farm that used a fifty-cow rotary milking parlor like the one pictured in Figure 1. Such a farm is a highly-industrialized lifeworld. *Great Hopes Farm*, a pseudonym that mirrors the optimistic and futuristic tenor of the actual farm, runs on a system of round the clock rotations. There are about forty staff members who work day, night, and on split shifts. A little under one third of them are Chinese nationals contracted (indeed indebted to work as "trainees") for three years, and Vietnamese on extendable visas; some workers are from farm families and many are self-described *furiita-* (non-permanent, contracted staff).[24] Workers are usually in their twenties and most are not locals. On the farm where I did the majority of my fieldwork, the average turnover rate for a laborer is about 11 months. Together, these human workers — owners, laborers, Japanese, or not — milk and care for over 2400 Holstein cows, a number that is steadily growing. The goal of this particular owner is to reach 3000 head before he retires in 2020.

Managing human staff is, on paper, straightforward. Basically, it is like working in any 24 hour-a-day service industry, in that workers come and go, but in terms of a *functional network* (at least in the mind of the owner) all elements (actants, human and bovine, alongside equipment) work in concert with the end-goal to get milk from the cow to the holding tanks, to the distribution trucks, and to the dairy-product manufacturing companies three times a day (a network of labor within the network of distribution). However, in this environment the management of cows is particularly telling. On average, a given worker's contact with a specific cow and the equipment in the milking parlor is only 18 seconds, when legs, udders, pneumatic suction cups, and digital

readouts pass by them at eyelevel. This is viewed and calculated as an average *unit* of interaction, that is to say, of production. One can average how x number of workers can extract y liters of milk from z number of cows with A equipment from B company with headquarters in C country, per hour, per day, per year. And such information is used to logically decide what equipment ought to be purchased by a given farmer and marketed by a given company.

**Figure 2: Human eye view of the automated milking Process. (Photo by author.)**

Functional and clearly marking how things work, like the above network of gas production and distribution, it is easy to grapple with the outlay of an industrial farm from such a macro network perspective. Cows are number coded, ear tagged, fitted with a sensor, and largely sorted by a central computer program. A truly panoptic apparatus, the rotary dairy is networked directly to a central data system. The parlor records daily milk output, cow weight, and similar data, which are augmented by central office data that includes birthdates, cow costs, a history of illnesses, attempts at AI, and even the cost of semen utilized for each attempt. All of these rates can be averaged out, making it possible to discuss an *average* (though in actuality non-existent) cow much as I discussed a *typical* (though also non-existent) human worker. Other aspects of mechanized technology separate particular cows with a series of linked and automated pneumatic gates. When the aforementioned *computer and machine network* deems certain cows to be in need of medical attention or due for attempts at impregnation (usually due to average times calculated through periods of lactation or fluctuations in relation to average body temperature), *it*, the equipment, acts. Via the

sensors in the collars of cows and the constant feedback of encoded information to the central computer, the equipment separates cows in need of human attention. In short, the life of each cow is meticulously, one could say nearly irreducibly, documented. Insofar as it is possible, each cow is controlled by a constellation of automated systems rooted in a linking and coding of averages and binary logic that is only rarely overridden by human hands or checked upon until the cow is, quite literally, *in the hands* of the owner or a veterinarian. Average workers, average cows, and a network of binary systems all working in concert until the point of human-cow contact.

**Getting Beyond an Animal and Network Environment: Take One**. Even from this superficial description a number of networks in Latour's general sense should be obvious. There are networks of workers two- and four-legged; one is organized by-and-large in the head of the owner, while the other is managed largely by a computer system and its networked surveillance technologies. Thus, these animated humans and nonhumans can be seen as networked via an inanimate nonhuman, the rotary milking parlor and its modes of both milk and data collection. But as aforementioned, and similar to Latour's cooking-gas cut-off scenario, the potential to create networks beyond those physically observed and encountered is hard to exhaust for a creative mind, one could freely associate elements and distribute agency. Take, as an explanatory nonhuman example, a cow-parlor-computer-gate-veterinarian network. This can be observed when the information about a cow is sent to the computer, which then relays a code to the parlor to separate a cow for an attempt at AI impregnation by one of the veterinarians who visit the farm daily. This is a reasonable, cursory explanation that I expand upon in ethnographic detail below. The problem, hopefully obvious, is that these links can (and do) go on *ad infinitum* and *ad absurdum*: forever unto abstraction. Or, turtles all the way down, as the colloquial phrase goes. The problem is, as Strathern puts it, "the fractal logic … of networks within networks," and where to "cut the network" to render it meaningful (*Partial Connections* 523). She assures us that it is through ownership that the network must be paused and interpreted, and in what follows I agree, but perhaps not in a way with which she would concur.

**Hands-On Milking: Practical, Situated, and Embodied Engagements.** Again, I view network chasing and tracing as a project with limitlessly positive potential. I am not suggesting that this be cast aside. It pinpoints connections as process-oriented and without superimposed hierarchies (truly hyphenated hybrids).[25] In the above case, it allows for the abstract conceptualization of human-animal-technology (with or without the hyphens for the case at hand) to be, in some sense, theoretically anthropomorphized (rendered relational in human terms), without becoming anthropocentric.[26] Clearly,

agency is not human only in such actor-network assemblages, and bravo for this much needed conceptualization.

But these boons do not come without costs. The "free association" and "irreduction" that Latour highlights, allowing for actors to be made apparent even in terms of his more micro oriented [NET], also acts to sterilize life and embodied agency from what are, in actuality, very individuated and qualitatively unequal processes. In sum, it denies multiple individual enviro-worlds in order to construct a coherent story of coming together or the sharing values, for that matter. It denies the fact that living things have their own unequivocal forms and inimitable situations that connect them with other living things, let alone nonliving things.[27] It denies the different perceptions of the environment by actors — other than the researcher — in constructing the network. Indeed, it seems to me impossible to account for every aspect of *be*ing. One is reminded of Uexküll's tick, a creature whose umwelt consists of three perceptual indicating processes and the ability to wait for 18 years to feed![28] As in my example of cow ghosts in the introduction to this article, can we view the tick as an agent? For a start, with what can one equate or weigh such actants in relation to other actants, while still accounting for the particularities of the environmental context and embodiment? The irreducible linking of tick, tree, and unwilling host is an interesting and basic explanatory device, a metaphor, a root image. But such connections, beings, and places, though all relatively simple in this case, are depoliticized, made vague and general. These are agents without life. That is, *be*-ings without histories, without trajectories, without choices, without values or value, even without bodies or environments, lacking any accounting of the innumerable contingencies that even make their linking possible at all. In sum, these agents are not *practically engaged* in the world. Instead, they are at worst nodes in a network, at best they become generalized stand-in nouns meant to index or symbolize their particular and contingently shared *umwelten*. They are, thus and in fact, *practically deployed* points of contact created by the researcher/writer, time frozen markers of chosen relations — lest the networking continue without closure.

I liken this view of networks to be like the observation of a family photo, flattened glimpses of connections, of life as lived together. And in such a vision (or one could say version) nonhumans may have a presence. Perhaps in the family photo a pet dog is in the frame, or the new family car, for that matter, but this, as is commonly said when viewing photographs, is not the whole picture. It is an indexical image without inherent context and as such its meaning depends on the viewer's interpretation. It is a creation of connections in the acts of taking and viewing. If there are any values here, they are

the values bestowed by an observer, either taking or viewing the photo, and are not necessarily shared by the subjects in the photo.

**Explorations in Embodiment and *Umwelten*: Take Two.** The above argument suggests that the idea of network, though constructive in a macro sense, needs to be re-examined and recalibrated if used from an ethnographic perspective or at the micro level of interpretation and explanation. The following section focuses on the process of AI or artificial insemination, in order to highlight how this can be accomplished by bringing *network* to bear without it being overbearing on qualitative analysis. Unaddressed in the previous parlor-network example is the particularity working in the Tokachi environment. One can seasonally rue either shivering or sweltering much of the workday. For humans, dwelling in such place can often be uncomfortable. One could push this further along a phenomenological track. Differing people have differing *values* in this case. That is to say, differing tolerances and perceptions of hot and cold related to individual temperaments, embodiments, life histories, etcetera. More to the point, a particular environment flavors how a given individual approaches relations with human and bovine others, not to mention the multitude of complex and negotiated relationships to non-sentient things, from snow tires to cold-drink vending machines. But all told, this is simply to highlight the inherent abstractions required for the construction of a macro network approach. In essence, the environment can be utterly left out of the macro network and animal equation. Moreover, such differences are all the more amplified beyond any human, animal, object divide.

In reality, however, environments are ever-active and externalizable. In Tokachi, depending on time of year or even the time of day, climatic temperatures can sour or save milk. Cooled grease can slow the equipment, while hot grease causes the occasional breakdown. Snow either needs to be time-consumingly shoveled or it does not. And, human workers (to leave cows out for the moment) are not just *workers*, interchangeable nouns, markers, or actants' playing their role in the formulation of a network. The diversity of their backgrounds always surprises my Japanese colleagues. Chinese, Taiwanese, Japanese, Brazilian, Indonesian, urban and rural, male and female, high school dropouts and prestigious university graduates, tall, small, outgoing or shy a dairy farmer *type* does not exist beyond wild context and individual-denying abstractions provided by macro level analysis.[29] One ethnographic point underscoring the intense particularity of dairying as an embodied experience is the fact that, as noted above, although there is only 18 seconds of interaction with these bovine others in the context of the milking process, workers nevertheless remember particular cows, and cows can react differently to particular workers during this short moment of

contact. This stems from the multiple histories kept outside the frame of the *family photo* style of network analysis. Countless individualized interactions at other points of the workday, time spent feeding or cleaning these 2400 bovines, for example, come to bear on the exchanges made in a day's hundreds of 18 second *snapshots* of human-cow-technology meetings during milking in the rotary parlor.

As noted, Ingold theorizes such historical and embodied interactions as *meshworks* as opposed to networks (Ingold 63-94). In the network-inspired versions of the milking process agents or "actants" are seen as points of process imposed onto the background or environment, and through these general forms observers describe relationships such as a *typical* milking process or an *average* family farm. However, a life of experiences and long-term interactions cannot be captured by flattened relations at the moment of time-compressed contact that make up these observations. Life, from a micro or existential perspective, is in the doing, being, living, and becoming. Seemingly old school ANT, the hyphenations are always there for me, but in my reading each line is a reminder of particularity. They are lines indicative of complex connections, not a simple mark of assembling hybridity. When a family name is hyphenated, like Munia-Kanazawa, this line might only be read as having a macro meaning, the eligibility for a dual passport, for example. But it is the long-term lines of entanglement I am after, lines of bodies, histories, desires, values, and perceptions that comprise the lifeworld of the farm or family from the micro perspective. It is the fuzzy connections and the lived and particular experiences of these specific beings and things that start before an ethnographer's observations and will carry on after the ethnographer is back home writing them up. The hyphen, in short, is never the same. It's a mark that must be read as highlighting existential and phenomenological complexity, not abstract connection. To accept a networked depiction as holistic is to foreground what is indexical over what is experiential. For Ingold, the difference here comes from a perspective influenced by Heidegger, on one hand, and Deleuze and Guattari, on the other. He emphasizes a dwelling perspective (being *in* the world), in that to be, or to exist, is to be in a shifting state of *becoming*: being *in*, and *a part of* the world, and not being imposed on the world. It's not a case of being or becoming, but of existing ever-between. Such an embodied history and process-oriented understanding is concomitant with the idea of relations as a *haecceity*, not as bound and static nodes or point-to-point connections, but as lines in motion that do not meet at a point, but forever pass or entwine. In describing these differences in detail, Ingold playfully contrasts the social network of ants, each performing its task, each working towards the same goal, with the creation of a spider's web (89-94). The web is a meshwork uniquely integrated into its environment, with every fiber lending itself as a skillfully produced and perceptive extension of the body ordered to fulfill its purposeful and intended use for capturing prey. Each strand has a

cumulative and considered history. From this perspective, what cuts the network, so to speak, is indeed ownership. It is an individual's *ownership* or possession of a specific body, perception, history, and abilities or skills to act in (as a part of) a particular web of self and multiple others (animate and inanimate) that is developed (and ever-developing) in concrete places, and not in abstract spaces. As such, and in terms of micro participation, and not only macro observation, mesh is a much better metaphor for such particularistic relations.

This is in part because webs usually are not as easily made abstract and stagnant as networks, thought about as uniform structures or pondered upon from afar. As Ingold notes (89-94), for webs to exist they must be a successful and creative engagement of and within a particular environment by a particular creator with certain capabilities. Or, put another way they are the process of a skillful web maker engaging in a distinctive place. This is the enviro-world of a living and shared ecology, and most importantly, a position were macro abstractions devoid of place, time, and embodiment, however indexical, such as the network or the animal in general, cannot exist in actual experience. Put simply, the web must remain *of the world*, particular in its individual components, connections, and limitations.

Again, the point being made here is not to deny or discard animal or network as useful concepts. Indeed, artificial insemination is an example of a process where network and meshwork are mutually informative in describing an inter-(enter)-relationship of animal-human-technology encounter. The base network can be hyphenated much as those described above. AI can be described in general as a human-cow-technology network. Or, more precisely, as a veterinarian~cow~stock semen entanglement … maybe squiggly lines, wayfaring lines in Ingold's sense, are more indicative of thinking through imbroglios. One can abstract this out in any direction, tracing the training of the veterinarians, the history of various breeds of dairy cow, or mapping the extraction and distribution of bull semen, for example. But when it comes to the micro experience of AI, individualizations cut this network, providing a rather graphic example of a human~cow~technology meshwork.

**Figure 3: Artificial Insemination in action. (Photo by author.)**

It is difficult to imagine a more invasive act than the entirety of a human arm being inserted into a human anus. However, the inserting of a human arm inside the rectum of a cow is a daily AI practice. What alarms many people witnessing AI interactions for the first time is the basic nonchalance of cows, and indeed of humans, as well. One is forced to question, how can we be embodied so differently? While young cows are generally skittish the first time (and the veterinary students I have witnessed are as well), by the third or fourth time cows barely seem to notice. What cannot be observed is the reason for the insertion of the arm. The hand in the anus is used as guide for the application tool entering the vagina into the uterus; this is a common explanation and practice, in general. But veterinarians will confess that within every cow the exact placement of the semen differs. Every cow's internal meshwork of flesh, muscle, and tissue is unique, and it takes a skilled hand to react to the micro level inconsistences and movements of the living body. Moreover, the choice of semen is not a random act. Here, for the impregnation to be successful a number of factors need to, as is commonly said, mesh: the timing of estrus and the life history of the particular cow plays an essential role alongside the will of the owner, the seasoned expertise of the veterinarian, and of course the most *scientific* of all processes, luck.

**Taking Participant Observations Literally: Seeing and Doing Beyond Social Metaphors.** Concluding with an example used earlier in this paper, as the interdisciplinary projects of ANT and STS evolved, they enabled researchers to look at the enviro-world in a new way. Like a moment of Zen awakening in the social sciences,

they made readers and practitioners notice, and in the relatively short order of a few decades, how *natural* categories, and even the disciplinary ones, that we thought existed external to politics are in actuality constructed and mutually influencing, permeable and alterable. Bruno Latour in particular has motivated anthropologists, including myself, to shake themselves free from an anthropocentric view of agency and to trace the irreducible complexity of living processes. However, as Clifford Geertz says of Lévi-Strauss, another paradigm-founding French anthropologist, insofar as network (or [Net]) and animal are appropriate forms of reference in specifically ethnographic inquiry, I remain "appreciative and unconverted" (27). In other words, I find myself torn in terms of Latourian thought and its relation to *doing* ethnography.

For example, when Latour attacks what he sees as "default social" of social science practices I find myself in full agreement.[28] He suggests that "the social" has become a dominant metaphor,

> the default position of our mental software. [The social] … takes into consideration the following: there exists a social "context" in which non-social activities take place; it is a specific domain of reality; it can be used as a specific type of causality to account for the residual aspects that other domains (psychology, law, economics, etc.) cannot completely deal with; it is studied by specialised scholars called sociologists or socio-(x)—"x" being the placeholder for the various disciplines; since ordinary agents are always "inside" a social world that encompasses them, they can at best be "informants" about this world and, at worst, be blinded to its existence.… [T]his default position has become common sense not only for social scientists, but also for ordinary actors via newspapers, college education, party politics, bar conversations, fashion magazines…. The social sciences have disseminated their definition of society as efficiently as utility companies deliver electricity and telephone services. (*Reassembling the Social* 4-5)

But cannot the over-inclusivity of the social that Latour critiques in this excerpt (rightly in my view) be seen in contrast to the treatment he offers informants in his more recent *An Inquiry Into Modes of Existence* noted above? Further, can we not view the overextension of the social in many ways as analogous to the "free association" and "irreducibility" of the network, or the use of general nouns such as actant or animal over meshwork associations and particular agents? Can these all-encompassing terms not face a similar critique? For example, there are courses on how to effectively

network. Networking is frequently used as verb. And there are social networks, broadband networks, and global networks of X or Y. All are, of course, useful shorthand referents in terms of general processes. Just as in common speech, a human can at once have *animal* instincts seen as a positive perceptive attribute, while at the same time be chastized for acting like an *animal* in other ways. We don't claim someone has the instincts of a hippo or claim some unruly person is acting like a giraffe, because we have specific associations with animal types, and ethnographically this is all the more important. Zookeepers may well associate a particular hippo or giraffe as having these qualities, and in my own work with dogs and cows many are seen as having idiosyncratic personalities and qualities.[30] Like "the social" as a macro-level catch-all concept, these macro metaphoric expressions of network and animal remain too functionally "fuzzy" if deployed without particular and embodied engagements. They lack the micro meshing found in individual beings and things and their particularistic and singular historical interactions. In sum, as participant observers we have grown far too accustomed to focusing on the metaphoric and macro notion of *human social structures* at the expense of the flipside, the participatory and micro-perspective of *more-than-human individual agencies*. A final example to reinforce this point can be seen in the work of anthropologist and political activist Didier Fassin, in particular a study, albeit limited to the human, that addresses a very real macro/micro dilemma in focusing on observational human networks as a guiding concept when considering participatory more-than-human meshworks might be more appropriate.

In his article "Scenes From Urban Life: A Modest Proposal for a Critical Perspective Approach," Fassin examines the differing worldviews of municipal police officers and the residents of a working-class suburb in Paris. The ethnography revolves around the macro level networked perspectives of the police versus the experiential meshworked perspectives of the residents (though, to be clear, he does not use Ingold's terminology). In the ethnography, due to a minor miscommunication in the network of information regarding a routine traffic violation, twenty police officers descend on a low-income neighborhood largely populated by African immigrants, hoping to catch the traffic violator by surprise. If this seems a touch heavy handed, it is justified because via another computerized network of intelligence, the traffic violator is also suspected of being a well-known drug dealer. That is to say, a human network defined this suspect, or actant, as a traffic violator in the first instance, and a second computerized network defined the suspect, more condemningly, as a drug dealer. For the police, the two identities are superimposed to become one hybrid suspect, a subject whose actual existence is now the conflation of two separate networks. Without announcing their purpose for entering the neighborhood, they chase several youths who, utterly unaware of what is going on and having prior negative experiences with the police (both in the

meshed and networked sense — being personally harassed or having had issues with "the system") run from the police. Of course, now the police enter the meshwork, in their experience, and not being a subjugated minority, they believe innocent people have no reason to run from them. At this point, members of the community and family members intervene on behalf of these well-known individuals, the young adults they are familiar with. They outline that they know the drug dealer the police are after and that they are willing to help with the investigation, but at the same time, being residents, knowing the day-in-day out particularities of the environment, they are sure that the suspect is not in the neighborhood at the moment the police are there. Confident in their networks, and likely now caught in a mutual meshwork of distrust, the police are undeterred by the residents' claims. Finally, after breaking his sister's arm, they arrest their key suspect only to find that he could not be the perpetrator of the traffic violation. He is legally blind. And, as it turns out, he is not the suspected drug dealer, either.

Fassin goes on to describe how the particular embodied, and historically situated, enviro-worlds of the police officers and these low-income residents were utterly incommensurate. Police, from a few points of networked reference — a drug deal here, or a theft there — had developed a network view of the neighborhood as a dangerous and *inhuman* place. Residents, however, through their daily dealings and dwelling saw it as a meshwork, a good community with a few known bad elements. Fassin suggests that the truth of the incident lies in between these perspectives; I would say: between the meshwork of individual relations (family and neighbors) and the network of larger irreducible connections (crime rates and dangerous areas). And as such, flipping the way I have framed ethnography first, Fassin notes that understanding the event must be

> an interpretation that seriously takes into consideration both perspectives and renders them co-intelligible. Ethnography is crucial here, but it cannot do all: it must be sustained by historical and sociological knowledge. (376)

Working on ethnographic topics where the objects of study routinely transgresses what are assumed to be the normative physical and affective boundaries of non-human and human, the concepts of network and animal have great potential to frame interactions. They have proven to be essential metaphors to communicate findings from a macro and comparative perspective. Yet network and animal remain problematic to square with embodied experiences of informant or ethnographer. This is especially the case when one conducts research largely rooted in anthropological ethnography, a mode of

inquiry dependent not only upon the *observation* of lives, but on the historical long-term affective and embodied *participation* in and with particular persons and their lived lives. As such, the strength of ethnography as a research genre is not found in its ability to support or buttress macro level metaphors, but to push back at the limits of those conceptualizations.

**Acknowledgements.** I am indebted to Uchiyamada Yasushi, Kimura Shuhei, Robin O'Day, Dan White, Gergely Mohacsi and my former students at Tsukuba University for ever-challenging and changing my thinking during my 'tour of duty' at that institution. The original Japanese publication of sections of this paper would have been impossible without the opinions, input and translations of Kikuchi Mari.

Notes

1. This paper emerged out of a conference presentation in 2014 at the University of Tsukuba's Global Science Week. As a result of that meeting, parts of this paper were published in a Japanese language version translated by Kikuchi Mari and originally entitled [毛むくじゃらで曖昧な境界：社会的メタファーの境界でエスノグラフィーすること] ("Fuzzy Bounds: Doing Ethnography at the Limits of Social Metaphor" trans. Mari Kikuchi in *History and Anthropology* 42 [2015]: 29-46). Tsukuba University, Hokkaido University, The Japan Foundation, and The Japanese Society for the Promotion of Science have, at various stages, provided funding for the research at the core of this project. I am also extremely grateful for the feedback offered by the two peer reviewers of this article.

2. For research on Hokkaido, and notably the industrialization of its dairy industry, see Hansen, "Culturing and Agricultural Crisis in Hokkaido"; "Becoming bovine"; "Urban Japan's 'Fuzzy' New Families"; "Milked For All They're Worth"; and *Hokkaido Dairy Farm: Change, Otherness, and the Search for Security*. For research on urban Japanese dog–human relations "Urban Japan's 'Fuzzy' New Families" and "Linking Cosmopolitanism and Multi-species Touch in Contemporary Japan." And for comparative research on these themes in urban and rural Jamaica, Kingston and the Parish of Saint Thomas, "Communication Break Down: "Politricks" and Mixed Dairy Farming in the Parish of Saint Thomas, Jamaica."

3. For examples of such ANT- or STS-influenced work see Callon et al, Franklin, and Latour. Sismondo provides a book-length summary.

4. See Hayles and Wolfe for bookend interpretations of posthuman concerns, and Smart and Smart for an accessible summary of posthumanism's presence in anthropological research and writing.

5. See Derrida regarding "the question of the animal," specifically the notion that referring to "animal" in the abstract is an act of erasure or violence in terms of particularity — like using the term "cat" to refer to one's companion, "woman" to one's lover, "boy" to one's son is to focus on general classifications over actual relations.

6. Haraway's most recent work, *Staying with the Trouble*, discusses this notion of "being with" in detail.

7. In *Witchcraft, Oracles and Magic among the Azande* Evans-Prichard undermines the notion that logic is a particularly European construct. Different cultures have different coherent and "common," or shared, conceptualizations of logic, such as cause and effect. Cetina is the classic reference in discussions of "epistemic cultures."

8. This quote, though extremely accurate even today, remains somewhat of a disciplinary legend, as the actual quote attributed to Kroeber is hard to find. For more on this debate see Heesun Hwang et al. "Anthropology is the Most Humanistic of the Sciences..." on *Open Anthropology Cooperative*. Accessed March 3rd, 2017. (Online.)

9. See Ingold; Jackson; Markowitz; and Stoller for phenomenological and existentially influenced examples of ethnographic research.

10. The ground-breaking ethological work of both Uexküll and Imanishi moves beyond the classification systems of "animal as object," attempting to bring *being* to the fore. It is clear that their work pioneered contemporary multispecies ethnography or post/non-human studies. See Kirksey and Helmreich, Kohn, Smart and Smart and Wolfe.

11. Anthropological ethnography involves not only observing (or interviewing) but participating alongside (or doing/being with) *Others*, whether human or non-human. See also Hansen, "Crossing, Not Creating, Boundaries" for a more detailed version of the argument made here.

12. Such connections are made increasingly complex, often untraceable, in accounting for non-human agencies. This is a key point in recent work by Beck; Bennett; Descola; Haraway; Kirksey and Helmreich; and Kohn.

13. See Strathern's *Partial Connections* for a book length treatment of these issues.

14. See Hansen, "Urban Japan's 'Fuzzy' New Families."

15. See Hacking's *The Social Contract of What?*, and Latour's *Reassembling the Social: An Introduction to Actor-Network-Theory* for critiques of the use of social as type default adjective or marker.

16. See Ingold; and Rabinow for similar engagements.

17. See Nussbaum, and much of the work of social anthropologist Nigel Rapport, especially *I am Dynamite: An Alternative Anthropology of Power* and the more recent *Anyone: The Cosmopolitan Subject of Anthropology*.

18. Latour's desire to flatten relationships, that is, to de-anthropocentrize discussions of agency by focusing on heterogeneous assemblages, has been a much-needed macro-level social science critique. See also Callon, Lascoumes, and Barthe, especially pp. 226-228.

19. There is a growing body of work here beyond my own work, such as Shir-Vertesh's discussion of urban canine personhood and Kohn's examination of Amazonian lives, such as Jaguars as persons, are key examples.

20. The point could be made giving any number of examples of complex and tangential relationships. The endlessness with which such relationships can be traced (and indeed manufactured and ignored) by the fictional ethnographer Latour uses as his "modern" research trope is the key problem. His following and tracing "irreducible" connections, "however dizzying it may be" (*Inquiry* 43), is exactly the problem for a micro level investigation. I suggest no ethnographer, focused on specific lives and relationships, would seek to explain or understand such macro level networks in their entirety (the economic system of resource extraction to food production or the history of Christianity). At best, anthropologists are dealing with interpretations (self and other) of specific relations and interpretations (at best) of entire systems.

21. For an in-depth discussion of Hokkaido's dairy industry see and its many particular issues consult Hansen's *Hokkaido Dairy Farm: Change, Otherness, and the Search for Security*.

22. For works on general trends in agriculture industrialization and its impacts, see Kirby, and in terms of agriculture, Pollan.

23. Japan's *nōrinsuisanshō* (Ministry of Agriculture Forestry and Fisheries or MAFF) statistics show a sharp rise in farm size and the number of cows per farm in Hokkaido from 1999, with a glitch in 2013-2015 due to aging farmers and a particularly hot summer. MAFF "Monthly Statistics Index" English Version.

24. See Hansen, "Milked For All They're Worth: Hokkaido Dairies and Chinese Workers." In Japan *furiita-* (free-timers) are contracted precarious employees.

25. There is volumnious reference material focused on notions of hybridity. I find Bijker (262-267) to be particularly clear. Regarding my own use of hyphens, I think that hyphens are useful from a micro perspective. They underscore that one is not speaking of categories, but of particular lines or linkages. Animal-human-technology, to me, underscores connections of various elements into an idiosyncratic whole: It is a focus on the moment of hyphenation (the "now" of particular connections).

26. See Bennett (98-100) for the important distinction between anthropomorphism and anthropocentrism as a problematic that neo-vitalist and object-oriented ontology is attempting to address.

27. A point that Imanishi (9-20) prophetically addressed.

28. See "The Tick" in von Uexküll (44-52).

29. See Hansen, "Milked For All They're Worth: Hokkaido Dairies and Chinese Workers" and "Kyoko's Assemblage: Escaping '*futsū no nihonjin*' in Hokkaido" for a more theory-oriented breakdown of individual agency.

30. See Hansen's "Urban Japan's 'Fuzzy' New Families: Affect and Embodiment in Dog–Human Relationships"; "Becoming bovine: Mechanics and metamorphosis in Hokkaido's animal-human-machine; and "Linking Cosmopolitanism and Multi-species Touch in Contemporary Japan." for more detail.

**Works Cited**

Ambros, Barbra. *Bones of Contention: Animals and Religion in Contemporary Japan*. U Hawai'i P, 2012.

Barua, Mann. "Circulating Elephants: Unpacking the Geographies of a Cosmopolitan Animal." *Transactions of the Institute of British Geographers* 39.4 (2014): 559-573.

Beck, Ulrich. *World at Risk*. Polity Press, 2009.

Bennett, Jane. *Vibrant Matter: A Political Ecology of Things*. Duke UP, 2010.

Bijker, Wiebe. *Of Bicycles, Bakelites, and Bulbs: Towards a Theory of Sociotechnical Change.* The MIT Press, 1997.

Blue, Gwendolyn and Melanie Rock. "Trans-biopolitics: Complexity in Interspecies Relations." *Health* 15.4 (2010): 353–368.

Bogost, Ian. *Alien Phenomeology or What It's Like to be a Thing*. U Minnesota P, 2012.

Callon, Michel, Pierre Lascoumes, and Yannick Barthe. *Acting in an Uncertain World: An Essay on Technical Democracy.* Graham Burchell, trans. The MIT Press, 2011.

Cetina, Karin Knorr. *Epistemic Cultures: How the Sciences Make Knowledge*. Harvard UP, 1999.

Derrida, Jacques. *The Animal that Therefore I am*. David Wills, trans. Marie-Louise Mallet, ed. Fordham UP, 2008.

Descola, Philippe. *The Ecology of Others*. Geneviève Bodbout and Benjamin Luley, trans. Prickly Paradigm Press, 2013.

Evans-Prichard, E. E. *Witchcraft, Oracles and Magic among the Azande*. 1937. Oxford UP, 1976.

Fassin, Didier. "Scenes From Urban Life: A Modest Proposal for a Critical Perspective Approach." *Social Anthropology* 21.3 (2013): 371-377.

Franklin, Sarah. *Dolly Mixtures: The Remaking of Genealogy*. Duke UP, 2007.

Geertz, Clifford. "Anti Anti-relativism." *American Anthropologist* 86.2 (1984): 263-278.

_____. *Works and Lives: The Anthropologist as Author*. Stanford UP, 1988.

Hacking, Ian. "Making up People." *The London Review of Books* 28.16 (2006): 23-26.

_____. *The Social Construction of What?* Harvard UP, 2000.

Hansen, Paul. "Becoming bovine: Mechanics and metamorphosis in Hokkaido's animal-human-machine." *Journal of Rural Studies* 33 (January 2014): 119-130.

_____. "Betwixt and Between JA: Japan, Jamaica, Agriculture, Education and the Will to Employment." *The impact of Internationalization of Japanese Higher Education: Is Japanese Education Really Changing?* Hiroaki Kawamura, John Mock, and Naeko Naganuma, eds. Sense Publishers, 2016. 159-75.

_____. "Communication Break Down: "Politricks" and Mixed Dairy Farming in the Parish of Saint Thomas, Jamaica." *Jamaican Dairy Board* 2015: 1-18.

_____. "Crossing, Not Creating, Boundaries." *The Journal of the Royal Anthropology Institute* 13.4 (2007): 1007-1013.

_____. "Culturing and Agricultural Crisis in Hokkaido." *Asian Anthropology* 13.1 (2014): 52-71.

_____. *Hokkaido Dairy Farm: Change, Otherness, and the Search for Security.* PhD Dissertation. University of London, 2010.

_____. "Kyoko's Assemblage: Escaping '*futsū no nihonjin*' in Hokkaido." *Escaping Japan: Reflections on Estrangement and Exile in the Twenty-First Century.* Blai Guarné and Paul Hansen, eds. Routledge, 2017. 152-178.

_____. "Linking Cosmopolitanism and Multi-species Touch in Contemporary Japan." *Japan Forum* (forthcoming).

_____. "Milked For All They're Worth: Hokkaido Dairies and Chinese Workers." *Culture and Agriculture* 32.2 (2010): 78-97.

_____. "Urban Japan's 'Fuzzy' New Families: Affect and Embodiment in Dog–Human Relationships." *Asian Anthropology* 12.2 (2013): 83-103.

Haraway, Donna. *Staying with the Trouble: Making Kin in the Chthulucene*. Duke UP, 2016.

_____. *When Species Meet*. U Minnesota P, 2008.

Hayles, Katharine. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. U Chicago P, 1999.

Imanishi, Kinji. *A Japanese View of Nature. "The World of Living Things by Kinji Imanishi."* Pamela Asquith, Heita Kawakatsu, Shusuke Yagi and Hiroyuko Takasaki, trans. Routledge, 2002.

Ingold, Tim. *Being Alive: Essays on Movement Knowledge and Description*. Routledge, 2011.

Jackson, Michael. *Lifeworlds: Essays in Existential Anthropology*. U Chicago P, 2013.

Kirksey, Eben, and Stefan Helmreich. "The Emergence of Multi Species Ethnography." *Cultural Anthropology* 25.4 (2010): 545-576.

Kirby, David. *Animal Factory: The Looming Threat of Industrial Pig, Dairy, and Poultry Farms to Humans and the Environment*. St. Martin's Griffin, 2010.

Kohn, Eduardo. *How Forests Think: Toward and Anthropology Beyond the Human*. U California P, 2013.

Lakoff, George and Mark Johnson. *Metaphors We Live By*. U Chicago P. 2003.

Latour, Bruno. "On Recalling ANT." *The Sociological Review* 47.1 (1999): 15-25.

_____. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford UP, 2006.

_____. *An Inquiry Into Modes of Existence: An Anthropology of the Moderns*. Catherine Porter, trans. Harvard UP, 2013.

Markowitz, Fran. "Blood, Soul, Race and Suffering." *Anthropology and Humanism* 31.1 (2006): 41-56.

Nussbaum, Martha. *Frontiers of Justice: Disability, Nationality, Species Membership*. Harvard UP, 2006.

Pollan, Michael. *The Omnivore's Dilemma: A Natural History of Four Meals.* The Penguin, 2006.

Rabinow, Paul. *The Accompaniment: Assembling The Contemporary*. U Chicago P, 2011.

Rapport, Nigel. *I am Dynamite: An Alternative Anthropology of Power*. Routledge, 2003.

_____. *Anyone: The Cosmopolitan Subject of Anthropology*. Berghahn Books, 2013.

Shir-Vertesh, Dafna. "'Flexible Personhood': Loving Animals as Family Members in Israel." *American Anthropologist* 114.3 (2012): 420–432.

Sismondo, Sergio. *An Introduction to Science and Technology Studies* (2nd edition). Wiley-Blackwell, 2010.

Smart, Alan, and Josie Smart. *Posthumanism: Anthropological Insights*. U Toronto P, 2017.

Stoller, Paul. *Sensuous Scholarship*. U Pennsylvania P, 1997.

Strathern, Marilyn. "Cutting the Network." *The Journal of the Royal Anthropological Institute* 2.3 (1996): 517-535.

_____. *Partial Connections*. Altamira Press, 2004.

Turner, Victor. *The Ritual Process: Structure and Anti-Structure*. Transaction Publishers, 1969.

von Uexküll, Jakob. *A Foray Into The Worlds of Animals and Humans: With a Theory of Meaning*. [1934]. Joseph O' Neil, trans. U Minnesota P, 2010.

Wolfe, Cary. *What is Posthumanism?* U Minnesota P, 2010.

Young, Allan. *The Harmony of Illusions: Inventing Post Traumatic Stress Disorder*. Princeton UP, 1997.