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An ‘axe for the frozen sea’: Estrin’s Magic Agential Realism, Insect Thigmotaxis, and the Problem with Kafka

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I think we ought to read only the kind of books that wound or stab us. If the book we're reading doesn't wake us up with a blow to the head, what are we reading for? So that it will make us happy, as you write? Good Lord, we would be happy precisely if we had no books, and the kind of books that make us happy are the kind we could write ourselves if we had to. But we need books that affect us like a disaster, that grieve us deeply, like the death of someone we loved more than ourselves, like being banished into forests far from everyone, like a suicide. A book must be the axe for the frozen sea within us. That is my belief.

Franz Kafka¹

“Animals have interests, too.”

“Yes, they do.”

“Even insects?”

“Of course.”

“Even male insects?”

Alice got up from the bed.

“Oh, Gregor, don't be silly.”

Marc Estrin²

“Human” bodies are not inherently different from “nonhuman” ones. [...] The differential constitution of the human (nonhuman) is always accompanied by particular exclusions and always open to contestation.

Karen Barad³

This paper contends that Marc Estrin’s *Insect Dreams: the Half Life of Gregor Samsa* constitutes the first piece of magic agential realist literature about insects. I have coined the term ‘magic agential realism’ on the basis of an observed coincidence in the literary commitments of Estrin’s novel with the literary genre of magic realism and the posthumanist assumptions it shares with the agential realism of Karen Barad. Given Franz Kafka’s axiom that a literary work *ought* to function as an ‘axe for the frozen sea within us’, a further claim remains to be substantiated: namely, that Estrin’s *Insect Dreams* is the axe that shatters the frozen sea of liberal humanist representationalism within Kafka’s own

¹Kafka’s letter to Oskar Pollak, written on January 27, 1904, in Kafka, *Briefe 1900-1912*, ed. by Hans-Gerd Koch (Frankfurt/Main: Fischer, 1999), p. 36.

²Marc Estrin, *Insect Dreams: The Half Life of Gregor Samsa* (Newark, DE: Blue Hen, 2002), p. 101. Further references will be given in parenthesis in the text as (*ID*, page number).

³Karen Barad, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (Durham/London: Duke University Press, 2007), p. 153. Further references will be given in parenthesis in the text as (*MUH*, page number).

work. Before these claims are made and their supporting arguments followed, however, agential realism remains to be defined.

Agential realism as developed in *Meeting the Universe Halfway* by Karen Barad, who is both a feminist philosopher of science and a theoretical physicist, begins with the philosophy-physics of Niels Bohr, a Danish physicist best-known for his work on the Copenhagen interpretation of quantum mechanics. The naturalist commitment of Bohr takes him to the central premise of quantum physics: 'we are a part of that nature that we seek to understand' (*MUH*, p. 26). According to Barad, Bohr tries to draw out epistemological lessons of quantum theory and his own thesis of complementarity from a critical examination of how variables are measured and consequently, of how knowledge is constructed. Agential realism is proposed as an 'epistemological-ontological-ethical framework' that provides an understanding of the 'role of the human *and* nonhuman, material *and* discursive, and natural *and* cultural factors in scientific and other social-material practices' (*MUH*, p. 26). Agential realism, respecting the fundamental integrity of nature and our concerns about it, seeks to provide a 'posthumanist performative account of technoscientific and other naturalcultural practices' (*MUH*, p. 32). What Barad means by 'naturalcultural' is the following: bodies come to matter not only because there are cultural forces like language in place, but also because there are natural and not merely social forces that matter.⁴ Agential realism is further iterated in Alessandra Tanesini's excellent feminist re-interpretation of Richard Rorty, to which I will sporadically return later.

The naturalist premise of Bohr leads to a naturalised epistemology that is valiantly opposed to the *aprioristic* epistemology of the Kantian sort. Quinean naturalised epistemology suffers infamously from a normativity deficit, with W. V. O. Quine requiring that the normative be reduced to the non-normative. What the naturalised epistemology of Bohr and Quine leaves us with is a philosophy that is 'wholly bereft of normative standards or values'.⁵ Without normative standards or values, we are left without any adequate criteria for rational theory-choice and with a distinct inability to explain our knowledge of the development of scientific knowledge.

This fails to heed Elizabeth Potter's injunction about the need to 'balance normative and naturalistic requirements in feminist philosophies of science'.⁶ According to the feminist interpretation of Tanesini, Richard Rorty attempts a delicate balancing act between disenchanting naturalism, in which there is no place for the normative in the natural world, and a rejection of reductivism of the Quinean sort that seeks to reduce the normative to

⁴ For further discussion, see *MUH*, pp. 431-435, where Barad, following Bohr and Rouse, re-conceptualises measurement as a causal intra-action in which the natural and the cultural (social, economic, geopolitical) meet.

⁵ Christopher Norris, *Epistemology: Key Concepts in Philosophy* (London: Bloomsbury Publishing, 2005), p. 9.

⁶ Alessandra Tanesini, 'Naturalism and Normativity: Rorty and Barad', in *Feminist Interpretations of Richard Rorty*, ed. by Marianne Janack (University Park, PA: Penn State University Press, 2010), pp. 199-216 (p. 200). Tanesini refers to Elizabeth Potter, *Feminism and Philosophy of Science: An Introduction* (London/New York: Routledge, 2006).

some non-normative physicalistic vocabulary.⁷ With Barad's agential realism, however, which is deemed a veritable instance of 'feminist naturalism' by Joseph Rouse, we encounter a view of nature as normative.⁸ In the view of nature forwarded by the agential realist, such norms as the norm of complementarity exist and are to be found in nature.

Barad's agential realism seeks to provide a robust materialist account of how *both* human and non-human bodies come to matter. More than just representing with language, we perform with our bodies.⁹ Posthumanism takes issue with the 'speciesism' or 'human exceptionalism' entailed by the linguistic turn, and refuses to play along with Protagoras' notion that 'man is the measure of all things' (*MUH*, p. 136). Barad's posthumanist concerns are taken up to full effect in Estrin's novel. Gregor Samsa, the protagonist of Kafka's novella, is revealed to have somehow survived his putative death in the original, and he proceeds to have experiences that range from post-World War I Vienna to the Manhattan Project in New Mexico in Estrin's sequel. How a posthumanist Estrin moves the counters that have previously been set up on Kafka's humanist board is instructive of the nature of the posthumanist enterprise. Nature has for too long been relegated to a mute or inarticulate surface on which human language inscribes its marks. Witness the transformation of the voice of Kafka's insectoid Gregor, to the extent that his family (human proprietors of language) no longer understand his utterances and conclude that he is seriously ill. Estrin, rejecting the liberal humanist assumptions of Kafka, turns his insectoid Gregor into a speaker of German, Yiddish and English (and a learner of the Sanskrit in which J. Robert Oppenheimer famously waxed lyrical). Estrin further seeks to effect what Kari Weil has called the 'counter-linguistic turn', through Gregor's reading of Rainer Maria Rilke's *Duino Elegies*:

With all its eyes the creature-world beholds
The open. But our eyes, as though reversed
Encircle it on every side, like traps
Set round its unobstructed path to freedom.¹⁰

Whereas animal eyes—among them Gregor's two-thousand-lensed compound eyes—perceive the open in which matter and meaning meet and mingle, humans remain within the representationalist trap, disadvantaged by their own consciousness and use of language. We learn that there are non-human modes of knowing which bypass language. We learn that the *ungeziefer* is in no way inferior to the human. Despite taking in blurry overall images, the *ungeziefer* possesses vastly more acute peripheral vision and perception of motion. We learn that the *ungeziefer* has a more adept chewing and digestive system than our own, and that it can even detect earthquakes 'as small as 0.07 on the Richter scale' (*ID*, p. 12). Ludwig Wittgenstein, so vital to effecting the linguistic turn within philosophy, is

⁷ Tanesini, pp. 199-216 (p. 204).

⁸ Joseph Rouse, 'Barad's Feminist Naturalism', *Hypatia*. Vol. 19, Nr. 1 (2004), 142-61.

⁹ See also my discussion of Barad in relation to Butler below.

¹⁰ Rainer Maria Rilke, 'The Eight Elegy', in *Duino Elegies*, trans. by J. B. Leishman and Stephen Spender (New York: Norton, 1963).

himself a victim of the counter-linguistic: he is unable to see in the dark when he visits Gregor, leading Gregor to comment on human frailness before proceeding to light a lamp (*ID*, p. 57). Even though it is Gregor who is caged, Wittgenstein, as the human outsider looking in, is described as 'clinging on to the bars like some prisoner of the world outside' (*ID*, p. 54).

The trope of metamorphosis, used by Kafka as nothing more than a tool for reflecting the dehumanizing and alienating aspects of human culture, remains analogical rather than diffractive in the sense intended by Barad.¹¹ Diffraction, first and foremost, is a physical phenomenon in which waves combine when they overlap and spread out when they encounter an obstruction. As Richard Feynman—himself turned into a character in Estrin's *Insect Dreams*—has pointed out, this phenomenon, whether we call it 'diffraction' or 'interference', has to do with the physics of the superposition of waves.¹² X-ray diffraction is a technique used today to determine the atomic structures of crystals, and Donna Haraway (in many respects as much a forebear of Barad as Bohr is) suggests that this technique allows for science to return to the living world, as interference patterns rather than living images are traced. Haraway, however, has not developed (to the degree that Barad has done) an account of how diffraction is an account of knowledge as intervention rather than mere copying. Barad intends to avoid analogical methodology due to its ties to the tropes of reflection and mimesis in representationalism. Instead, she favours a more diffractive methodology. Barad is once more re-invigorating and re-inventing Rorty, who in *Philosophy and the Mirror of Nature* pointed out the undue reliance of philosophy on a correspondence theory of truth and on a representational theory of perception.¹³ Kafka's trope of metamorphosis maintains its critical distance from the *ungeziefer* that Gregor Samsa is. Representationalism concerns the idea that representations and the objects of representation are independent of one another. Many might argue that the *locus classicus* of representationalist doctrine is to be found in Wittgenstein's *Tractatus Logico-Philosophicus* (or at least the positivist interpretation of it). Here, according to Wittgenstein's picture theory of representation, the world is 'a totality of facts, not of things'.¹⁴ However, this would be to do gross injustice to the complexity of the Tractarian view of representationalism, wherein representations and the objects of representation share an identity of logical structure. Tractarian correspondence occurs by virtue of an identity of logical structure between word and world. Rather, the notion of correspondence as an analogical relation between word and world (both of which remain distinct from and independent of each other) owes much to the Austinian view of representationalism.¹⁵ That

¹¹ While the claim that Kafka's trope of metamorphosis is analogical might sound tautological, I would like to clarify that I am using 'analogical' in the sense intended by Barad (as opposed to such a trope functioning in a 'diffractive' manner, again in the sense intended by Barad).

¹² Richard P. Feynman, Robert B. Leighton and Matthew Sands, *The Feynman Lectures on Physics* (Reading, Mass: Addison-Wesley, 1964), p. 30.

¹³ Richard Rorty, *Philosophy and the Mirror of Nature* (Oxford: Blackwell, 1980).

¹⁴ Ludwig Wittgenstein, *Tractatus-Logico-Philosophicus*, trans. by D. F. Pears and B. F. McGuinness, intro. by Bertrand Russell (London: Routledge and Kegan Paul, 1961), §1.1.

¹⁵ I am indebted to Tanesini for this suggestion about the subtle (though doubtless present) distinction to be made between Wittgensteinian and Austinian representationalism.

Kafka is enmeshed and implicated in the humanist framework of representationalism is understandable enough: he was a product of the Newtonian-Cartesian paradigm that bound the human understanding of his time.

Concerns about where the human ends and the non-human begins pre-date Descartes's discussion about automata in *Meditations on First Philosophy* (by twenty centuries, to be precise). In the 'Discussion on Making All Things Equal' chapter of *Zhuangzi*, Zhuangzi, a fourth century B.C. Chinese Daoist philosopher, relates a dream in which he is a butterfly fluttering about. Upon waking, he is unsure whether he was Zhuangzi who 'had dreamt he was a butterfly, or a butterfly dreaming he was [Zhuangzi]'.¹⁶ Amid the proto-Cartesian scepticism, Zhuangzi ventures further to state that there must be some distinction between the human dreamer and the butterfly, and concludes that key to understanding this difference is '物化', or the 'Transformation of Things'.¹⁷ One might well translate '物化' as 'Metamorphosis', a term which squares better with the discussion at hand, thereby opening interesting perspectives on the possible co-extensiveness of metamorphosis, identity and co-identification. Kafka, like Zhuangzi, is aware that the dream trope allows him to interrogate the boundaries between the real and the imaginary, and the intelligible and the unintelligible: he has Gregor awake from troubled dreams and into the more troubling reality of having transformed into an *ungeziefer*.¹⁸

Scepticism becomes a theoretical problem with Descartes's *Meditations*, as Descartes prioritizes epistemology before metaphysics. There is a further sense in which, with the advent of the Cartesian *cogito*, it is epistemological scepticism that creates metaphysical individualism. A corollary of this scepticism is the charge levelled at Estrin's Gregor Samsa by a six year-old claiming that he is a man dressed up in an insect suit. Against the *aprioristic* Cartesian move to privilege epistemology over metaphysics as first philosophy, Barad places epistemology and metaphysics on equal terms within her epistemological-ontological-ethical framework. What is recommended by Barad to overcome Cartesian scepticism is a scepticism toward scepticism. More precisely, the faith we place in our access to representations (for instance, Samsa as represented by a man dressed up in an insect suit) over things (for instance, Samsa as himself) is not a logical necessity but rather a mere 'Cartesian habit of mind'. Agential realism holds out for the possibility that knowing can result from 'a direct material engagement' with the world as it is constituted by an ontology of patterns (*MUH*, p. 49).

To borrow the terms from Stanley Cavell's essay 'Knowing and Acknowledging', we need to move from knowing to acknowledging the other, in order to quell the tide of

¹⁶ Zhuangzi, *The Complete Works of Chuang Tzu*, trans. by Burton Watson (New York: Columbia University Press, 1968), p. 49.

¹⁷ Watson's translation.

¹⁸ Franz Kafka, 'Metamorphosis', in *Metamorphosis and Other Stories*, trans. and intro. by Michael Hoffman (London: Penguin Books, 2007), pp. 85-146 (p. 87).

scepticism.¹⁹ Take, for instance, the challenge posed by the figure of the automaton, a challenge mounted by scepticism that cultivates as much as it is cultivated by a horrible distrust of humanoid figures. Whether the automaton occurs in philosophy (in Descartes's *Meditations*) or in literature (in E. T. A. Hoffmann's 'The Sandman', wherein a human falls in love with Olympia, later discovered to be an automaton), what is at work – as Sigmund Freud's discussion of 'The Sandman' makes explicit – is the uncanny.²⁰ By refusing to make the distinction between the human and the non-human the important or defining one, we acknowledge the other (automaton or insectoid) in an ethical leap of faith.²¹ This leap of faith, in turn, is uncanny: it makes the unfamiliar familiar. Turning our attention from the automaton to the insectoid, we acknowledge Gregor by virtue of his material engagement with the world: he sees through compound eyes, hears with his knees instead of ears (which he lacks), opens doors with his claws and at one point, lives off dumpsters. This acknowledgement extends to the various women who make the ethical leap of faith and engage in coitus with Gregor in spite of his *ungeziefer* form in the course of Estrin's novel (although this leap of faith is never easy, as attested to by the post-coital sexual trauma of these women).

As an analogical trope, Kafka's metamorphosis puts the *ungeziefer* aside, re-inscribing the nature-culture binary upheld by an Enlightenment humanism in which nature is othered.²² On the other hand, agential realism—with its commitment to posthumanism—refuses to take the distinction between the human and the non-human for granted. Our understanding of what it means to live as an insect is *diffracted* through Estrin's trope of metamorphosis, a trope that entails (and here was an implication that Kafka's liberal humanism did not feel obliged to pursue) that Gregor is at once a conjunction of the insect-in-the-human and the human-in-the-insect. What matters, according to agential realism, is no longer simply the human (as liberal humanism will have us assume), but—more rightly—matter itself. As Barad states quite simply: 'matter matters' (*MUH*, p. 210). What matters is what is of normative significance, and norms (the norm of complementarity, in particular) are to be found in nature. These norms that we find in nature lead to our understanding phenomena in terms of 'patterns or repeatable configurations' rather than things *tout court*.²³ The trope of human-to-insect metamorphosis, as Estrin discovered at the expense of Kafka, is uniquely poised to deliver to us the agential realist promise of matter as the material for the world's 'differential becoming' (*MUH*, p. 91). Barad's diffractive methodology does not seek to understand physics (or to bootstrap it into providing an account of the world), but

¹⁹ Stanley Cavell, 'Knowing and Acknowledging', in *Must We Mean What We Say? A Book of Essays* (Cambridge: Cambridge University Press, 2002), pp. 238-266.

²⁰ Sigmund Freud, *The Uncanny*, intro. by Hugh Haughton and trans. by David McLintock (London: Penguin, 2003).

²¹ While it might be countered that the kind of acknowledgment I am describing is more easily accorded in the encounter with a certain kind of literary account rather than in a philosophical or non-fictional account, such a counter would still leave my thesis firmly intact *vis-à-vis* the posthumanist value of Estrin's literary work and the literary trope of metamorphosis. In addition, philosophical accounts are themselves not entirely averse to the use of thought experiments, which call upon the diffractive imagination in a manner similar to the literary trope of metamorphosis.

²² For further reading see R.G Collingwood, *The Idea of Nature* (Oxford: Clarendon Press, 1945).

²³ Tanesini, p. 208.

to change and engage with it (as she succeeds in doing by providing a new interpretation of quantum physics). Likewise, Estrin's sequel to Kafka's 'Metamorphosis' does not seek so much to understand Kafka's work as to revise its liberal humanist assumptions. Re-writing becomes essential in this task: Estrin revives the *ungeziefer* that we presume Kafka's charwoman has disposed of, has Gregor survive Kafka's death in 1924, and even—on the twentieth anniversary of his literary creator's death—engages in the critical re-evaluation of the humanist legacy of Kafka. Echoing Bruno Latour's call for a parliament of things in which a greater symmetry will obtain between human and non-human entities, Estrin has his insectoid Gregor enter into the service of (and later even attempt to influence) the Roosevelt administration after a fateful handshake with Franklin Roosevelt.²⁴

A further connection between Barad's agential realism and what I have termed Estrin's 'magic agential realism' may be discovered in Barad's discussion of the Stern-Gerlach experiment and the related role that Gregor's thigmotaxis plays in the development of the atomic bomb. Notwithstanding the growing sophistication of constructivist arguments, a key charge that has been levelled against constructivism is its apparently anti-realist claim that science mirrors culture, with nature taken out of the equation. Barad, with painstaking attention to historical accuracy, re-constructs on behalf of agential realism the Stern-Gerlach experiment, which set out to examine space quantization.²⁵ Otto Stern's cigar smoke, containing sulphur, caused the silver to turn into black silver sulphide. Had Stern drawn a higher salary, he would have bought good instead of cheap, sulphur-filled cigars, and Barad argues further that cigar-smoking constituted Stern's 'gendered and classed performance of masculinity' (*MUH*, p. 167). The Stern-Gerlach experiment was later found to constitute evidence, not for space quantization, but for the existence of the spin (angular momentum) of the electron. Agential realism contends that the apparatus we use to measure variables is itself part of a larger material phenomenon, from which we exclude nature at our own peril. Estrin has the thigmotaxis of Gregor play the same role as the cigar of Stern in the development of the first atomic bomb under the Manhattan Project.

Thigmotaxis, derived from the Greek 'thígm' for 'touch', refers to the movement of organisms in response to contact with other solid bodies. Cockroaches, being thigmotactic, like being in tight spaces (or, as Amadeus puts it: 'Roaches love to be touched all around' (*ID*, p. 9). It is through the thigmotaxis of Gregor that Seth Neddermeyer, the American physicist working on the Manhattan Project, chances upon his alternative method of bomb design, implosion, without which the entire project would have foundered.²⁶ The phenomenon of thigmotaxis in insects, along with the phenomenon of thigmotropism in

²⁴ Bruno Latour, *Making Things Public: Atmospheres of Democracy*, ed. by Peter Weibel (Cambridge, MA: MIT Press, 2005).

²⁵ The Stern-Gerlach experiment has since been taken as a reference point for the demonstrability of electrons and atoms having intrinsically quantum properties such as spin angular momentum.

²⁶ Estrin makes the same causal link in his meditative essay on his book. See Marc Estrin, 'Gregor Samsa's Dream of Life and Death: A Meditation by the Author on his Book', in *Penguin USA* <<http://www.penguin.com/read/book-clubs/insect-dreams/9781101220771>> [accessed 18 March 2013]

such plants as the mimosa, appears to suggest that sight has occupied too privileged a position in our epistemological economy.²⁷ If an ethics motivated by our understanding of thigmotaxis and thigmotropism is to be made intelligible, are we not warranted in replacing or supplementing our sense of sight with our sense of touch? What happens to the relation between sight and touch when we apply the aporia 'When our eyes touch, is it day or is it night' to both?²⁸ These concerns are no doubt central not just to insect ethics but to a possible re-configuring of ethics in general.

Performativity shifts the focus from a representationalist concern for analogies and correspondences toward 'practices or doings or actions' (*MUH*, p. 28). Barad draws her concept of performativity, of course, from the work of Judith Butler on the performativity of gender.²⁹ Along with Butler, Barad is careful to distinguish performativity from mere performance: a performance (theatrical or not) does not performativity make. When Butler makes the claim that gender is performed, she intends for us to understand that identity is not an 'essence' but a 'doing' (*MUH*, p. 62). Unlike Butler, however, Barad's agential realism seeks to provide a robust account of how *both* human and non-human bodies materialize. More than just representing with language, we perform with our *bodies*. Representationalism assumes that language is—or at least, ought to be—a transparent medium through which we describe the world. Meaning-making through language and cultural representation has disentangled matter from meaning: witness, for instance (as Barad points out), the linguistic, semiotic, interpretative and cultural turns (*MUH*, p. 132). Through these turns, we seek to collectively forget the Copernican turn which displaced man from the centre of his universe and re-foster our Faustian hubris. Performativity, by returning us to material bodies, contests the power of language.

Instead of the trope of metamorphosis being used to reflect our cultural concerns (as in the case of Kafka's 'Metamorphosis', which remains a work of liberal humanism), with Estrin, the function it performs is *diffractive* in nature. In Barad's work, each moment of measurement is an intervention that is specific and brings about new patterns of mattering and new normative statuses. A primitive version of the X-ray technology cited by Haraway occurs in *Insect Dreams*, notably during Roentgen's 'Trial by Radiation' when Wilhelm Roentgen (better known as the discoverer of X-rays) attempts to use X-rays emitted from a portable X-ray wagon to determine whether Gregor is an *ungeziefer* or a human (*ID*, p. 42). While it may be argued that the radiographic technique, unlike the technique of X-ray diffraction, remains bound by the geometrical optics of representationalism, Estrin is clever enough to problematize the boundaries between the human and the non-human even during the 'Trial by Radiation'. Roentgen, placing his left hand between source and screen, gets an image of both the skeleton of his hand and his marriage band—an early prefiguration of what agential realists would call an entanglement of human tissue and

²⁷ In thigmotropism, plants move or grow in response to touch stimuli.

²⁸ An aporia first introduced by Jacques Derrida in Jacques Derrida, *On Touching: Jean-Luc Nancy* (Palo Alto, CA: Stanford University Press, 2005). Derrida was inspired by Aristotle's meditations on the nature of sight and touch in *De Anima*, trans. by R. D. Hicks (New York: Cosimo Inc., 2008).

²⁹ Judith Butler, *Gender Trouble: Feminism and the Subversion of Identity* (New York: Routledge, 1990).

non-human metal. As both Barad and Haraway acknowledge, whereas reflection attends to mirroring and sameness, diffraction attends to patterns of difference. Haraway speaks of diffraction producing ‘effects of connection, of embodiment, and of responsibility for an imagined elsewhere’.³⁰ Through his ‘magic agential realism’, it appears that Estrin has extended this imagined elsewhere to the realm of insects.

Diffraction experiments have featured prominently in the wave-versus-particle debates concerning the nature of energy and matter. According to the classical, representationalist physics of Newton, only waves, which undergo the physics of superposition, can experience diffraction, whereas particles cannot. The two-slit experiment demonstrated that both energy and matter can produce diffraction patterns under certain experimental circumstances, and the Davisson-Germer experiment confirmed the de Broglie hypothesis that matter (such as electrons) exhibits wave-like behaviour under certain circumstances. It is at this juncture that Bohr’s thesis of complementarity arrives: the wave and particle properties of matter and energy are exhibited under complementary—which is to say, mutually exclusive—circumstances. As Barad states, these observable properties showing up depend on the nature of the apparatus (*MUH*, p. 106). Under certain experimental circumstances, matter and light behave as a wave, and under others, they behave as a particle. Bohr’s thesis of complementarity may even be applied to re-interpret the Heisenberg uncertainty principle, which concerns the properties of position and momentum of a particle. According to Bohr, the norm of complementarity entails the following about the measuring apparatus: ‘the measurement of positions requires a rigid measuring apparatus and the measurement of momentum requires one with movable parts’ (*MUH*, p. 431, n. 33). Position and momentum are therefore not simultaneously determinate, not because there is a limit to what we can know (as Heisenberg would have us conclude), but because these properties require mutually exclusive experimental circumstances (*MUH*, p. 431).

Likewise, Estrin reminds us throughout of the hybridity of Gregor’s being: under certain circumstances, he behaves as a human, and under others, as an *ungeziefer*. Whether or not matter and energy behave as a wave or as a particle, whether or not the position or the momentum of a particle is determinate, and whether or not Estrin’s Gregor is insect or human depends on the nature of the apparatus through which we observe these properties. In the novel, these apparatuses are situation-specific criteria that lead characters to take Gregor to be insect on some occasions and human on others. Bohr’s thesis of complementarity, or Barad’s feminist naturalist account, is fundamentally a thesis about nature: the idea of complementarity provides us with norms in nature. Barad’s agential realism is not an ontology of entities, but—as Tanesini points out—an ontology of patterns that emerge within practices. Each pattern, functioning as the basic ontological unit, is co-constituted by the objects of measurement and the measuring apparatus. Insofar as parts of

³⁰ Donna Haraway, ‘The Promises of Monsters: A Regenerative Politics for Inappropriate/d Others’, in *The Haraway Reader* (New York/London: Routledge, 2004), pp. 63-124 (p. 64).

the apparatus can be constituted by the non-human, it would appear to be trivial to speak of the human *sensu stricto* as agential: how else is one to make sense of the role of Otto Stern's cigar smoke in the discovery of the spin (angular momentum) of the electron or the role of Gregor's thigmotaxis in Neddermeyer's discovery of an alternative method of bomb design for the Manhattan Project (implosion)?

That Kafka's novella, for all its brilliant absurdism, remains within the representationalist trap is evident in how he intends his reader to receive the *ungeziefer*. Except his sister Grete's early show of sympathy, Gregor's *ungeziefer* nature represents that which is to be either excluded or driven out of sight: Gregor's father tries to drive his insectoid son back into the room and later throws apples at him, while Gregor's mother plunges her face into her hands at the distressing appearance of her son. Even the cook begs leave to be let go, and the boarders become alarmed when they spot Gregor and decide to move out. Kafka intends for us to receive Gregor the *ungeziefer* (neither subject nor object) as a Kristevan abject, to be cast outside the symbolic order alongside such other abjects as waste and corpses.³¹ Whereas representationalism is content to exclude the non-human and the non-linguistic, agential realism seeks further to examine the 'constitutive effect of exclusions' (*MUH*, p. 28). Following the Japanese bombing of Pearl Harbour, Japanese-Americans are cast as *ungeziefer* to be re-located under Executive Order 9066, prompting the self-immolation of Yoshio Miyaguchi in protest. Likewise, following the murder of two men in a 1920 armed robbery, Ferdinando Niccola Sacco and Bartolomeo Vanzetti, two dark foreign males and Italian anarchists to boot, are scapegoated as *ungeziefer*. Following their protests of innocence right up to the point of execution, protests break out in Paris, Warsaw, London, Rio, Bombay, Sydney and Tokyo. Additionally, the cause of Italian anarchism is further constituted as Giuseppe Zangara, in the wake of the Sacco-Vanzetti case, attempts to assassinate Roosevelt in the novel, although he kills Mayor Cemak instead (*ID*, pp. 198-9).

The genius of Estrin's 'magic agential realism' lies in the final act of his novel, when Gregor *performs* his own suicide at the Trinity test site at Jornada del Muerto, his performance in turn being an iteration of the noble *seppuku* of Japanese samurai. Already, Bohr's naturalist commitment, inherited by Barad, attests to the central fact that we are a part of the nature that we seek to understand. Nature is real. Constructivism, for all its other failings, alerts us to the moments when new scientific knowledge is constructed, following the discovery of 'anomalies' or 'obstacle-concepts'.³² Barad re-names this moment the moment of 'measurement', in which the natural and the social meet (*MUH*, p. 67). Against the Cartesian and liberal humanist cut between the human and the non-human, agential realism urges 'quantum wholeness' and the *integrity* of the material whole. Estrin makes the same point in a far more poignant tone in Gregor's performance of his *seppuku*:

³¹ Julia Kristeva, *Powers of Horror: An Essay on Abjection*, trans. by Leon S. Roudiez (New York: Columbia University Press, 1982).

³² Thomas Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1970); Gaston Bachelard, *The Philosophy of No: A Philosophy of the New Scientific Mind*, trans. by G. C. Waterston (New York: Orion Press, 1968).

both insect and human are unable to survive exposure to the centre of the target of an atom bomb. Estrin riffs on the well-worn assumption that cockroaches are determined by their ability to survive a nuclear holocaust: they can tolerate far higher doses of radiation (measured in ‘rems’) than humans can. Through Gregor’s *seppuku*, Estrin seeks to remind us of the material affinity that a cockroach shares with humans, whatever stereotypes might exist about the ability of cockroaches to survive a nuclear holocaust: the high temperatures will suffice to cook the cockroach, deliberately placed at the centre of the target of an atom bomb, alive. Gregor’s body becomes the apparatus through which humanity is measured.

That the greatest minds ever assembled (Oppenheimer, Edward Teller, Enrico Fermi and Feynman) participated in the Manhattan Project; that the project continued long after the Alsos spy project revealed that there had been no German bomb project; that techno-scientific considerations overtook moral concerns; that the project would culminate in the Trinity test and (eventually) the dropping of Fat Man and Little Boy over Hiroshima and Nagasaki, leading to a death toll of between 150,000 and 246,000—these remain to be measured by Gregor’s act of *seppuku*. As Haraway reminds us, it is precisely the world which gets lost in doctrines of representation and scientific objectivity, a fact no more apparent than in the fate of humanity at the hands of the Manhattan Project. The mark left on Gregor’s body, following his six-legged suicide, is permanent and fatal. Gregor, despite his *ungeziefer* form, has worked throughout the novel as a flag-bearer for humanism, only to discover in the end that it comes up short when measured against his own ideals. His iteration of the Japanese *seppuku* is a timely reminder of how discursive practices involve not just language but matter as well. Discourse is not, under agential realism (magic or otherwise), simply language, for that would return us to the representationalist trap within which the linguistic turn finds itself. Discourse involves material-discursive practices that set the conditions of possibility ‘defin[ing] what counts as meaningful statements’ (*MUH*, p. 146). With a wordless, non-Western gesture performed upon an insectoid body, Gregor makes a meaningful posthumanist statement about what it would be like were nature able to pronounce its own verdict on culture and its claims about progress. With that same gesture, Estrin’s novel becomes the magic agential realist axe with which the frozen sea of liberal humanist representationalism is shattered. In providing us with a book that affects us like a disaster and like a suicide (both of which are evoked and exceeded by the ever-more pressing concerns of posthumanism), Estrin also fulfils *sensu stricto* the literary criteria laid out by Kafka to his Czech classmate, Oskar Pollak, almost a century before in 1904.

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