The scientific lab: sacrifice zones as contact zones

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Abstract

The scientific laboratory is often construed as a space in which with laboratory animals are sacrificed on the altar of biomedical progress. However, this understanding of nonhuman animals raises significant ethical concerns and appears complicit in the anthropocentric and colonial violence that creates sacrifice zones in Naomi Klein's sense. In this paper, we argue that contemporary literature can work towards an imaginative and affective reframing of the lab, which is no longer seen as a sacrifice zone but as a contact zone—a space of relationality and entanglement across the human-nonhuman divide. To explore this shift, we offer close readings of two contemporary narratives that centre on the lab: Tania Hershman's short story 'Grounded' and Jeff VanderMeer's *The Strange Bird*. In both of these texts, animals refuse to be made data through sacrifice and instead affirm, if in a limited sense, their own autonomy and vitality. Literary experimentation on a stylistic level plays a key role in this process: our readings highlight how both narratives evoke embodied (and more specifically haptic) connectedness with animals by deploying literary strategies that deconstruct the visual language associated with scientific objectivity.

Keywords

Literature and science, posthumanism, embodiment, contemporary literature, style

Introduction

Seeing science labs as 'sacrifice zones' is in many ways a matter of course. There are numerous words used to denote more or less euphemistically the killing of animals as part of scientific procedures in the lab: euthanise, dispatch, destroy, terminate. Of these, 'sacrifice' is one of the most common yet also most complex terms. Here is an example of this language, chosen almost at random from PubMed: 'Four-week-old male C57BL/6J mice had their left maxillary molars extracted. Implants were placed in healed extraction sockets and osseointegrated. Ligatures were tied around the implants and second molars. Controls did not receive ligatures. Mice were sacrificed 1 week, 1 and 3 months ($n \geq 5$/group/time point) post-ligature placement.'[1] Already in the 1980s, two separate anthropological studies by Arnold Arluke and Michael Lynch focused on the semantic layering of the word 'sacrifice' in the context of the science lab. As Arluke observes, the term brings up both pre-Christian and Christian conceptions of sacrifice, a religious baggage that tends to arouse suspicion in the scientific community. Nevertheless, the euphemism 'sacrifice' is still strikingly pervasive in scientific publications.[2] It is clearly not a coincidence that animal rights scholars and activists have strongly resisted this language: the term evokes the idea that nonhuman death may be necessary for the betterment of humanity, by helping scientists test theories that will ultimately lead to new insights into diseases or treatments.[3] For Lynch, sacrifice is the ritualistic act that enables the transformation of a fleshy animal body into the kind of abstract, generalised knowledge used to advance science:[4] killing lab animals erases their individuality and turns them into disembodied 'data points' for scientific research.

Discussing the complexities of this sacrificial rhetoric, Arluke sees sacrifice as a term ambiguously suspended between the objectification of animals and a recognition of the similarity or emotional bond between scientists and experimental animals: 'Objectification of laboratory animals provides some degree of emotional protection from awareness of the

preempted natural death of animals. Yet, although scientists and technicians need to distance themselves from the victim, they also find themselves moving toward the victim.'[5] While objectification creates emotional distance, the language of sacrifice captures *both* the distancing and the emotional connection that is frequently created as scientists find themselves working with laboratory animals. To quote again from Arluke's article, 'To engage in sacrifice is to kill another organism, yet that organism's loss of life also constitutes a loss to the person who is sacrificing.'[6]

In science's ritualistic 'sacrifice' of animals, the loss for humans is dually material and emotional. Materially, scientists lose the ability to make organism-level analyses. The animal is no longer a holistic entity, but can only be used and understood in a partitioned and abstract sense—namely, as data. Emotionally, 'sacrifice' also denotes the loss of an embodied or affective connection with the animal, both as animal and as a kind of quasi self. In model organism research—research where animal bodies stand-in for or model human bodies and diseases—the emotional loss is thus also self-referential. In sacrificing the animals, 'mirrors' in miniature, scientists lose a version of themselves.

This understanding of the science lab comes close to Naomi Klein's concept of sacrifice zone, an area or region entirely devoted to (and ravaged by) colonial-capitalist exploitation.[7] Nonhuman death in the lab is clearly related to the anthropocentric and colonial violence that creates sacrifice zones in Klein's sense. In particular, both are underpinned by an extractivist logic that relies on the reification of bodies and lively spaces. Yet the relationality involved in the language of sacrifice subtly departs from the unidirectional nature of capitalist depletion. Sacrifice involves a complex interplay between the instrumentalisation of nonhuman animals, their use as tools to pursue human ends, and a recognition of their status as lively beings, and even subjects, capable of asserting their individuality. Without denying that instrumentalisation *is* part of the daily experience and

work of laboratory scientists, this article considers how, in contemporary fiction focusing on scientific practices, the language of sacrifice may also usher in a recognition of emotional entanglement across the human-animal divide that resonates with work in posthumanist theory.[8] More specifically, we discuss how fiction can defamiliarise sacrificial rhetoric in the lab and foreground the relational aspect of experimental practices, which is latent in but mostly downplayed by conventional scientific discourse. In this sense, we read select fictional works as examples of what Catherine Elgin has influentially called 'literary laboratories.'[9] Like scientific thought experiments, works of fiction are imaginative constructs which 'advance understanding' by drawing out and testing the possibilities and consequences of particular sets of variables. As Elgin argues, both scientific and literary thought experiments 'enable us to see or recognize truths that we would otherwise miss.'[10]

If science laboratories are 'sacrifice zones,' then, they are sacrificial in a somewhat different sense from Naomi Klein's understanding of that term. Klein links sacrifice zones to extractivism, 'a nonreciprocal, dominance-based relationship with the earth, one purely of taking.'[11] The sacrificial relationship of the science lab is also, undoubtedly, dominance-based. However, by using the rhetoric of sacrifice scientists begin to acknowledge that lab animals can 'respond,' because their death involves suffering that is signalled by embodied and inherently emotional cues. This nonverbal language cannot be silenced or ignored, leaving emotional traces that are expressed, vaguely, by science's sacrificial rhetoric. To put the same point otherwise, the language of sacrifice suggests a beginning of (an uneven form of) reciprocity in human-nonhuman relations in the lab: scientists are not only 'taking' (the animals' lives) but also losing something in the act of killing them—namely, the possibility of an embodied connection with the animal.

With this in mind, we suggest that the literary representation of science affords a perspective on laboratory spaces as 'contact zones.' Like Klein's sacrifice zone, Mary Louise

Pratt's concept of the 'contact zone' is concerned with encounters of uneven and asymmetrical relations of power.[12] Yet, rather than unidirectional 'extraction,' contact zones involve *negotiation* and influence—even if the influence is complicated by an imbalance of power: one of the parties holds sway over the other, but it is nevertheless subtly reshaped by the interaction. While Pratt first coined the term to discuss encounters of and with colonial power from a cultural-linguistic perspective, scholars interested in 'multispecies matters' such as Donna Haraway have reframed the 'contact perspective' in a broader context.[13] Nevertheless, Haraway's discussion works as an extension rather than a renunciation of Pratt's postcolonial critique. Both colonialism and anthropocentrism share 'intwined logics of violence' that rely on processes of abjection and dehumanisation.[14] In extending this thinking to the nonhuman, Haraway emphasises how 'subjects are constituted in and by their relations to each other. [This perspective] treats the relations […] in terms of co-presence, interaction, interlocking understandings and practices, often within radically asymmetrical relations of power.'[15]

Even as it hints at reciprocity, the rhetoric of sacrifice foregrounds precisely this asymmetrical nature of human-nonhuman relations in the science lab. While recognising the inherent *value* of what is being sacrificed (namely, nonhuman life), sacrificial discourse ultimately affirms an allegedly superior, and inherently anthropocentric, value—typically, the fight against diseases that afflict human communities. As Lynda Birke puts it, building on Donna Haraway's work, the 'animal not only bears the gene . . . but also symbolically bears suffering for us.'[16] The sacrificial rhetoric here is distinctly Christian: the lab animal is seen as a Christ-like saviour, its suffering contributing directly to scientific progress and thus to human health.[17]

The sacrificial relationship remains 'dominance-based,' as we have said above, and fundamentally asymmetric. Nevertheless, the loss implicit in the idea of sacrifice does point

to a different way of understanding laboratory practices, one in which the human experimenter and the lab animal appear entangled physically and emotionally. We argue in this paper that human-nonhuman entanglements and moments of 'contact' are frequently brought out by contemporary fictions that focus on the lab—in the multiple senses of the word 'contact,' which include physical connection (through touch) and affective or conceptual interaction. Here the rhetoric of sacrifice is invoked, more or less directly, but it is also superseded as animals themselves challenge and shape the material and metaphorical components of human knowledge practices. This is a form of nonhuman 'resistance,' however fleeting, that is rarely seen in official scientific discourse and yet develops the hint of reciprocity found in sacrificial rhetoric.[18] No longer mere 'saviours' of humankind, animals can engage in a relationship with the human that challenges the power asymmetries of the science lab. In some instances, narratives centring on lab animals can even point to a posthuman future, one in which it is humanity itself that is 'sacrificed' (that is, left behind) as our species faces extinction. While the literary examples within this paper treat different nonhuman species (mice, birds, and moles), their shared status as biomodified organisms serves as our rationale for reading them together.

The literary imagination of the science lab thus becomes a means of pursuing a different kind of experimentation: one that isn't imposed *on* animals, but rather involves a reconsideration of binaries such as human vs. animal, subject vs. object, and mind vs. body. By bringing these realities into contact, the texts we examine play with experimentation on the levels of subject-matter, form, and concept: they do not simply comment on scientific experiments, but also use literary forms that are *experimental*—in the sense of innovative and unconventional—to experiment with conceptual boundaries.[19] Experimentation, in all three senses of the word, is thus shown to be central to contemporary fiction's critical engagement with laboratory-based science. Our case studies include the short story 'Grounded' (2017), by

Tania Hershman, and *The Strange Bird* (2017), a novella by Jeff VanderMeer.[20] Both are highly aware of science's relationship with sacrificial language, often invoking religion as a way of framing the ethical issues involved in scientific experimentation. That turn to religion (which is particularly explicit in Hershman's text) isn't a coincidence but a sign of the enduring cultural presence of religious imagery, particularly when it comes to understanding human implication in violence as well as a sense of shared vulnerability.

In different ways, both Western science and religion participate in anthropocentric thinking, so reconceptualizing sacrificial rhetoric implies a shift away from both institutional frameworks. This doesn't mean that the stories steer away from religious language and notions completely: at least Hershman's narrative seems to hint at the possibility of a spiritual understanding of human-nonhuman connectedness, via 'divine love' transcending species boundaries. Like the image of 'sacrifice,' the stories' relationship with religion (and particularly Christianity) remains inherently ambiguous: religious ideas both represent a source of anthropocentric assumptions and provide the writers with an emotional vocabulary that can be used against the grain of those assumptions. In principle, though, the view of human-nonhuman entanglement embedded in the two short stories can be uncoupled from a religious worldview; it echoes the ethics of connectivity articulated by Deborah Bird Rose: 'To think within a paradigm of connectivity is to imagine that living beings are always enmeshed in a shared moral domain that is dedicated to life's becoming.'[21] Perhaps there is a larger pattern to be identified here: also beyond the specific context of the science lab, sacrifice zones become full-fledged contact zones when they are experienced through modes of perception that bring out human-nonhuman interconnectedness. But that switch requires work of the kind that is often performed by the authors and readers of literature, so that literary practices themselves can be said to open up an imaginative contact zone for encounters with the nonhuman.[22]

In the next section, we briefly consider some of the affective elements we *do* find in scientific experimentation and its rhetoric before homing in on literature and a set of formal devices that, in our argument, enact both a critique of scientific experimentalism (particularly its official rhetoric) and an experimentation with conceptual boundaries between human and nonhuman animals: these devices exhibit what we call, developing the work of Eva Hayward, 'fingeryeyed' style.[23]

The embodied experimentalist

In the West, vision is the sensory mode that underpins claims to scientific objectivity.[24] It is a distal sense insofar as it allows us to perceive things from afar; this physical distance easily translates into conceptual separation between the subject and the object of perception. The visual language of scientific observation, for instance, suggests the observer's lack of participation in whatever is being observed—what Haraway has called science's 'god trick.'[25] By removing their presence from the act of observing, scientists affirm the objectivity of their findings. This link between objectivity and vision helps us explain why sacrificial discourse can be so disruptive in science. By acknowledging that something valuable (perhaps even a part of ourselves) is lost when a lab animal is 'sacrificed,' the scientist implicitly casts into doubt the objectifying distance of science: instead, the scientist is touched, however fleetingly, by their relationship with the animal. The literary texts we explore foreground the role of touch in science; yet, this reality of contact (in the sense of both physical manipulation and co-presence) is frequently erased in the technical, standardised writing of biomedical science.[26] The touch and entanglement we track in select literary texts build on the reality of laboratories as contact zones affording insight into transspecies relationality.

In a recent interview with David Naimon from Tin House Books, author Karen Joy Fowler summarises the famous 'Kellogg experiment' from the 1930s, which forms the basis

of her acclaimed novel *We Are All Completely Beside Ourselves* (2013). In this experiment, psychological scientists Luella and Winthrop Kellogg decided to raise an infant chimpanzee alongside their son to see what capabilities the chimp might have if it were raised in the context of a human family. The study lasted just nine months and was brought to an abrupt halt when the human child 'began to imitate chimp behaviour just as readily as the chimp began to imitate human behaviours.'[27] In an observation that evokes philosopher Vinciane Despret's work on animals in science, Naimon notes how the experiment was conceived in such a way that it failed to account for the possibility of the 'studied influencing the studier'; instead, it was built on the presumption—shared by many other experiments—that when we study animals we're *only* studying the animal.[28] At this point in the interview, Naimon inserts a clip from a lecture by Ursula K. Le Guin in which she emphasises relationality: 'Relationship among all things appears to be complex and reciprocal, always a two-way back-and-forth. It seems that nothing is single in this universe and nothing goes one-way […] a web of connections infinite but locally fragile.'[29] In experimental laboratories, this back-and-forth, or contact, takes a number of forms: we glimpse it in the ways in which researchers' handling of animals, their pheromones, and even their expectations all affect animal behaviour and experimental outcomes.[30] In addition, in a rare study into the psychological impact of animal research, Minju Kan et al. draw out the affective impacts of working with animals, finding that far from being 'emotionally immune' to the creatures they worked with—as the passive and distanced language of scientific reports we saw earlier might suggest—researchers working with animals scored consistently higher on State Anxiety Scales.[31] While undertaken with a limited sample, the findings led investigators to conclude that 'participation in animal experiments might [be a] significant, anxiety-provoking situation especially for the workers in their early stages.'[32]

The language of sacrifice thus walks a precarious line between enabling researchers to emotionally distance themselves from realities of animal death in laboratories while at the same time emphasising the lab's affordance of proximity and potential as a contact zone that changes 'the subject—all the subjects—in surprising ways.'[33] As we'll see in the following analyses of 'tactile looking,' through the lens of literary experimentation, sacrifice is defamiliarised and reframed as moral enmeshment—an ethical position that resonates with the accounts developed by Deborah Bird Rose, Rosi Braidotti, and other scholars working within a posthumanist paradigm.[34] Of course, this kind of reframing of sacrifice is clearly not enough to force us (as a society) to reconsider the use of animals in biomedical research; but by deepening our awareness of the reciprocity of human-nonhuman entanglement and its moral claims, it stands to complicate and extend the debate surrounding this issue.

Literature and 'fingeryeyed' style

As the above examples demonstrate, the language of touch appears far better suited than vision to express the reciprocity of human-nonhuman entanglement.[35] We can see without being seen, but we cannot touch a living being without giving them an opportunity to acknowledge or feel our presence.[36] In turn, the reciprocity of touch can help us reconceptualise vision itself by moving away from Western models of scientific distance and objectivity. This idea is already present in Maurice Merleau-Ponty's famous image of the blind man experiencing the world by tapping his cane, which Merleau-Ponty presents as a model for the active nature of perception in general.[37] Sensory perception, whether through vision or touch, is an activity that directly implicates the body of the perceiver, and the presumed objectivity of vision is not a model of how perception should work in general but rather a distortion of the perceptual act.

Anthropologist Eva Hayward has coined the term 'fingeryeyes' to describe this alternative way of thinking about perception, which involves reciprocity in the perceiver's embodied relationship with the human or nonhuman other that is being perceived: 'Attending to the interplay of vision and touch, I invoke fingeryeyes to articulate the in-between of encounter, a space of movement, of potential: this haptic-optic defines the overlay of sensoriums and the inter- and intrachange of sensations. Fingeryeyes, in this instance, is the transfer of intensity, of expressivity in the simultaneity of touching and feeling.'[38] 'Fingeryeyes' is a way of thinking about perception that stresses the (potential) reciprocity of any perceptual act, including those senses—such as vision or hearing—that are typically seen as distal and detached in a Western context.[39] Our interest here is in how contemporary fiction can experiment with stylistic form to elicit this 'fingeryeyed' mode of engagement. Like scientific objectivity, literary language, and particularly the language of description in the context of the realist novel, is deeply bound up with a visual model. As Roland Barthes argued in his seminal essay on the reality effect, Gustave Flaubert's description of Rouen in *Madame Bovary* is '*constructed* so as to connect Rouen to a painting: it is a painted scene which the language takes up.'[40] For Barthes, the real is evoked within the textual fabric of a literary work by way of an analogy with the visual language of painting.

Yet, that visual model is far from the only possibility for literary language. The word 'text' itself conjures up the haptic form of fabric, its texture. As Elaine Scarry shows in *Dreaming by the Book*, literary language can go a long way towards eliciting highly textured mental imagery, which is closer to the fine detail of touch than to the objectifying distance of vision.[41] Largely, that is the result of stylistic choices that encourage close engagement with characters' bodies and the space surrounding them, producing empathetic perspective-taking and a vivid, immersive sense of 'presence' in a fictional situation.[42] A case in point is the narratological strategy known as 'internal focalisation,' which involves a focus on a

character's private experiences—that is, experiences captured at a level of detail that would be unavailable to a mere external observer.[43] According to Anežka Kuzmičová, the representation of characters' goal-directed actions also deepens readers' sense of presence in a fictional world.[44] Linguistic cues such as creative metaphors and similes can also contribute to a narrative's atmosphere, favouring an embodied, 'fingeryeyed' mode of engagement.[45] Hans Ulrich Gumbrecht discusses this possibility under the heading of 'reading for Stimmung,' which 'means paying attention to the textual dimension of the forms that envelop us and our bodies as a physical reality—something that can catalyze inner feelings without matters of representation necessarily being involved.'[46] While Gumbrecht links 'Stimmung' to the auditory domain, it is possible to go further and argue that literary narrative excels at creating atmospheres that are 'tangible' or 'palpable'—two adjectives for vividness that are etymologically bound up with the sense of touch.[47]

To summarise, stylistic cues and narrative devices in literature can integrate a 'fingeryeyed' way of understanding perception: they emphasise embodied and affective closeness and enact some of the epistemological and ethical implications of 'two-way contact.'[48] This 'fingeryeyed' quality becomes particularly salient when the stylistic strategies examined here are combined with the foregrounding of touch on a thematic level. Our focus is on how fingeryeyed style can bring readers in touch with *nonhuman* characters, generating a distinctive dialectic of similarity and difference, empathy and defamiliarisation: through the affective closeness established with a nonhuman creature, readers are invited to reflect on (and potentially revise) their own anthropocentric assumptions.[49] The more experimental the text they are engaging with, the more defamiliarising potential it has—although it is certainly up to individual readers to take up this defamiliarising challenge. In the next two sections, we turn to Hershman's 'Grounded' and VanderMeer's *The Strange Bird* as two recent examples of how literary defamiliarisation can build on and develop the

sacrificial rhetoric deployed by scientific discourse. In these fictions, 'fingeryeyed' language can disrupt scientific objectivity and instead explore the potential for connection inherent in sacrificial language. In doing so, fingeryeyed style highlights ethical and affective reciprocity between scientists and nonhuman animals.

Resisting the gaze in Tania Hershman's 'Grounded'

A UK-based science journalist turned poet and short story writer, Tania Hershman often addresses scientific themes in her work. 'Grounded,' the first story in her collection *Some of Us Glow More than Others* (2017), consists of a series of poetic fragments. The longest of these fragments, the chapter titled 'God Glows,' focuses on the scientific experiments carried out by a woman, a trained physicist who is starting a new research career in biology. This woman—her name is Emmylene—is also a nun, but that is never presented as a surprising fact in the short story. Emmylene has a hard time explaining to her Mother Superior what the purpose of her planned experiments is; indeed, when four lab mice arrive with the rest of the equipment, Emmylene is unsure what to do with them: 'She reads the care instructions again and feeds her mice, resisting the urge to pick one up and stroke it.'[50] It is significant here that the mice are first described through the language of (denied) touch, as an urge that Emmylene must resist. That same haptic language comes up in the first section of the story (a paragraph-long chapter titled 'It Begins with Birds in Flight'), whose final lines read as follows: 'It ends with birds, tapping on the window, tapping and scratching, and the woman, her head up, her tea aside. It ends with the woman, birds tapping at the window, smiling' (10). Despite the physical separation created by the windowpane, the birds' tapping establishes an embodied connection with the woman (possibly Emmylene herself); in turn, the woman's smile is an acknowledgment of the birds' attempted contact. When faced with lab mice, however, Emmylene initially resists the lure of embodied communication. She has integrated the

rhetoric of scientific objectivity enough to know that physical separation and conceptual distance are required to create a sense of scientific authority.

Nevertheless, the possibility of maintaining this separation is challenged repeatedly throughout the story, often through the contrast between the tidy abstraction of physics and the material messiness of biological research: in biology, bodies come into contact in unruly and potentially disorienting ways. Emmylene's Mother Superior assumes science is going to be 'soothing'—there are suggestions of a traumatic event in the protagonist's past—but it proves to be far more destabilising than she expected. Not knowing what to do with the mice, Emmylene considers turning her fellow nuns into test subjects. She envisions collecting their blood while also voicing doubts about the procedure: 'Why blood? What for? What would you do with all that blood? Why would you take needles, look at their arms, look at their skin. Puncture. Puncture. The word rolls around her mind. Sharpness. A stab' (17). It is the 'fingeryeyed' proximity of bodies that Emmylene seeks through her experiments: proximity is here suggested by the imagined sensation of sharpness but also (on a stylistic level) by the staccato sentences and the quasi-onomatopoeic repetition of the word 'puncture,' which evokes rupture.

The plan to collect human blood instead of experimenting with the mice points to the fluid embodiment that underlies the text: the need for embodied contact is extended from nonhuman subjects to fellow human beings; in the process, scientific objectivity is undermined as Emmylene reveals that all she could discover in the blood is 'love' (21). This pervasiveness of divine love is the most significant spiritual element that is invoked by the story—surprisingly perhaps, given that the protagonist is a nun and the setting a religious community. This 'love' is presented as a force collapsing the human-nonhuman divide and thus resisting the anthropocentric logic active in both Christianity and science. The divine is thus retained in a metaphysical (and deeply emotional) sense, but it is uncoupled from the

framework of organized religion. Accordingly, lab animals are never 'sacrificed' in the narrative: reaching towards the (human or nonhuman) other is an unsettling process, perhaps, but it is never destructive. On the contrary, Emmylene's scientific 'grammar' or 'objective view' appears to falter under the gaze of the mice, which is here evoked indirectly rather than through internal focalisation: 'The mice, bolder, stare at her. Emmylene is looking for. Looking. For. Looking' (19-20).[51] The focus here is still primarily visual, but it is a form of vision that falters in its teleology: the more instrumental 'looking for' becomes, simply, 'looking,' or, perhaps even, looking *with*.[52] This is but a hint of the potential for the 'fingereyed perception' of nonhuman animals to impact human research findings. Only in the final section of the story do we see this interest in the haptic pursued more directly.

'Burrowing Blind' turns to (hybrid) animal subjectivity as it offers an enigmatic account of a 'mole squad' engaged in a project that remains indeterminate and thus echoes Emmylene's own fumbling experiments in the preceding pages. The text starts with an alliterative, fingeryeyed description of how—evoking the laboratory maze—one of the moles 'bumped and banged her way through the burrow, emerging bruised, blinking' (24). The moles become narrative agents here, their bodies taking centre stage and guiding the reader's imagination. Like Emmylene's genetically-modified mice, they are human creations: while the first mole is a 'bad one,' 'Five more later they had blinding down to a tee, no more calibration fuck-ups' (24). The goal of this specially-created-and-assembled mole squad is ambiguous: they're tasked with 'finding […] treasures, bringing back treasures' (25). The moles, especially in their early forms, bumble blindly on, led by touch rather than an ability to 'see' what lies ahead; though '[blind] as bats, as toads, as dark-eyed sloths, they saved the day' (25). In their roles as unseeing saviours in an unspecified quest, Hershman's moles take on a potentially allegorical role, gesturing to the continued undertaking of scientific research,

despite being unable to see where it might lead. ‘The work I’m doing,’ Alison Christy writes in an essay on animal sacrifice,

> Isn’t really pursuing a cure, although it is possible that my work could someday lead to some other research that would lead to a study that would lead to a treatment […] Maybe I am poking around in mice like the anatomists did in corpses, performing the most basic experiments so that one day someone can make a great leap. [How] can I predict now where the pieces I uncover will lead?[53]

Christy’s vision here takes on an extended, tactile quality. Her ‘poking around in mice’ blurs human-animal boundaries in a way that materially highlights the allegory’s own categorical confusions. The moles in Hershman’s text linger in a hybrid space between human and animal, exhibiting animal behaviours of burrowing, but also human behaviours like shooting a fellow mole who was too loud and might compromise the mission and, in a strange turn towards the end of the story, sitting in retirement home chairs and blinking in front of television and newspaper cameras with their medals for bravery.

Across the two sections of Hershman’s ‘Grounded,’ the juxtaposition of an aspiring scientist and the moles demonstrates how touch can entangle human and nonhuman subjects in ways that disrupt, productively, the standard procedures of scientific knowledge production. With these boundary destabilisations, readers are left with the question: in biomedical and human health research, is it humans or animals, or their hybrid entanglement, that ‘saves the day’? As for a response to this question, Hershman leaves readers in the dark.

Uneasy proximity in *The Strange Bird*

If 'Grounded' implies the violence of scientific experimentation without staging it directly, VanderMeer's novella *The Strange Bird* explicitly takes its cue from the violence inflicted on lab animals. The protagonist, the titular Strange Bird, is an animal that has been genetically modified with human DNA. In the story's first scene, she manages to escape the lab where her body has been repeatedly objectified and instrumentalised, only to be captured and abused by other human (or human-like) characters. The text tracks the bird's often traumatic experiences closely, through periodic flashbacks and sustained internal focalisation. We read that, 'in the laboratory, the scientists had taken samples from her weekly. She had lost something of herself every day. It was worse when they added something on, and then the Strange Bird had felt awkward, as if adjusting to an extra weight, and lurched off-balance on her perch, flapped her wings for hours until she felt settled again.'[54] The 'loss' that is at the heart of the sacrificial metaphor is here explored up-close and from the animal's perspective, via embodied similes ('as if adjusting,' 'settled') that render the experience of violently disrupted embodiment.

When the bird emerges from the lab, the postapocalyptic landscape surrounding her speaks to the capitalist exhaustion of the natural world that is at the centre of VanderMeer's novel *Borne* (in whose universe *The Strange Bird* is set). The text presents, quite literally, a bird's-eye view, but the language of vision is often enriched by 'fingeryeyed' attention (again, via internal focalisation) to the way in which this dangerous world impinges on the protagonist's body. While 'Grounded' focuses on the transformative possibilities of touch as it entangles the human and the nonhuman, *The Strange Bird* explores the dark side of proximity—how physical closeness can be turned into a violent gesture of subjugation. The most striking illustration of uneasy contact is provided by the scene in which a villainous character known as the Magician turns the Strange Bird into a cloak. The animal becomes a

mind locked into an inert object, a garment continually used by and in contact with another body: 'To live in such closeness to the creature that had unmade her could not be described, made every moment tense.'[55]

From that uncomfortably close vantage point, Strange Bird is a witness to the Magician's fluctuating fortunes as she battles against the monstrous bears that inhabit this postapocalyptic world. Eventually, when the Magician is defeated, the Strange Bird experiences falling 'limp and formless into the sea, and the sea [wrapping] itself around her in a comforting embrace, the most kindness she had ever known.'[56] This haptic embrace serves as a counterpoint to the violent touch of human objectification. But the comfort of that embrace is, for now, only a dream. For the Strange Bird, liberation comes when one of the protagonists of *Borne*, a character named Wick, discovers the Magician's cloak and manages to restore the creature's body. Wick also finds out that the Strange Bird carries a 'message' implanted by the scientists who modified her in the lab. It is here that VanderMeer's novella comes closest to the sacrificial rhetoric of religion and science, with the Strange Bird almost turning into a Christ-like saviour for humanity—a creature who 'symbolically bears suffering for us,' to quote again Birke.[57] But the text ultimately rejects the anthropocentric impulse behind that rhetoric. If Hershman had left the door open for a spiritual relationship with the nonhuman, in VanderMeer's narrative a recognition of entanglement does not elevate humanity beyond its material implication in nonhuman suffering: there is no redemption here, not even through transcendent love. Referring to the message inside her, which remains unknown, the Strange Bird realises that it 'had been a human need, the compass pulsing at her heart, and she was, in the end, much diminished for having followed it.'[58] If Strange Bird started out as a human-nonhuman hybrid through scientific experimentation, she now comes to distance herself, and reject, whatever is left of humanity in her.

Instead, the novella ends with Strange Bird singing, joyfully, because 'she was finally free and the world could not be saved, but nor would it be destroyed.'[59] As human salvation is denied both materially and spiritually, the creative possibilities of the posthuman world are celebrated. The 'fingeryeyed' style of VanderMeer's internal focalisation, which is sustained throughout the novella, supports this final vision. It evokes entanglement between the protagonist and the nonhuman creatures that share this ruined world with her, particularly the mysterious foxes that keep appearing and disappearing on the margins of the narrative. Unlike what happens in 'Grounded,' this haptic entanglement leaves the human on the side-lines. In terms of the reading experience, however, the reader's imagination does become entangled with Strange Bird as VanderMeer's stylistic cues create striking empathetic closeness to the protagonist.

Conclusion

This article started from the ambiguity of the word sacrifice, which is a peculiar form of objectification of the nonhuman that paradoxically acknowledges the extent and significance of the loss involved in the sacrificial act. As such, in the science laboratory, the religious language of sacrifice implies an incipient form of recognition of how humans and nonhumans are entangled both materially and existentially. Our case studies deepen this sense of human-nonhuman entanglement by adopting literary strategies that we have characterised, following Eva Hayward's terminology, as 'fingeryeyed.' These strategies fuse style and theme: they complicate the visual distance associated with scientific objectivity by foregrounding haptic forms of knowledge that blur the boundary between human and nonhuman subjectivity. In this sense, they experiment with co-presence and co-construction of subjects within the science lab understood as a contact zone. This process is mediated by literary creativity; thus, a more precise (if slightly unwieldy) way of characterizing

literature's operation would be to say that literary texts serve as imaginative contact zones affording new perspectives on the science lab as a *material* contact zone. They are, in other words, 'literary laboratories' (Elgin 2007) that experiment and engage with realities of interspecies reciprocity and entanglement.

In 'Grounded,' by Hershman, the fingeryeyed mode of narration centres on the parallel between the human protagonist and the moles of the final section. In *The Strange Bird*, by VanderMeer, readers are confronted directly—and not through the mediation of a human character—with a hybrid animal who is the victim of scientific and technological objectification. In both cases, touch becomes the primary sensory mode through which other sensory cues—including visual ones—are metaphorically mediated. Further, the fingeryeyed quality of Hershman's and VanderMeer's prose builds on formally unconventional literary strategies, such as Hershman's fragmentary and allusive narrative and VanderMeer's strict nonhuman focalisation. Literary experimentation is thus partially mapped onto *scientific* experimentation, an operation that troubles simplistic dichotomies between the human and the nonhuman, instead foregrounding (through a defamiliarising process) existential and moral entanglement.

While both stories adopt the religious rhetoric of animal sacrifice, they don't ask readers to take religious discourse at face value: religion only provides a point of departure for a sense of emotional connection with the nonhuman that may or may not be understood in spiritual terms. Arguably, Hershman's story, with its reference to divine love, cues that spiritual reading more strongly than VanderMeer's, which emphatically denies the possibility of humanity's salvation via a sense of more-than-human connection. If the two texts' use of religious imagery remains ambiguous, their relationship with science is more straightforward: they both depart from standard scientific rhetoric by confronting its uneasy negotiation of animals as objects of human knowledge and animals as lively beings. It is important to point

out, however, that we cannot expect literary texts to impact scientific practices directly: rather, it is through the mediation of readers and reading communities that the moral questions raised by fiction like Hershman's and VanderMeer's can reach scientists. There is a great deal of work to do in this regard, and it requires an interdisciplinary 'contact zone' of sorts, one that welcomes and enables genuine dialogue between humanists and scientists. We believe the narratives we examined in this article—and many other fictional narratives engaging scientific thinking—have significant potential as catalysts in this dialogue about knowledge, violence, and hope.

Notes

[1] Sarah Hiyari, Ryan L. Wong, Aline Yaghsezian, Azadi Naghibi, Sotirios Tetradis, Paulo M. Camargo, and Flavia Q. Pirih, 'Ligature-Induced Peri-Implantitis and Periodontitis in Mice,' *Journal of Clinical Periodontology* 45.1 (2018): 89–99, p. 89.
[2] Based on a PubMed search, the use of the term 'sacrifice' in bioscience research started to boom after 1999 and peaked in the 2010s.
[3] See Michael E. Lynch, 'Sacrifice and the Transformation of the Animal Body into a Scientific Object: Laboratory Culture and Ritual Practice in the Neurosciences,' *Social Studies of Science* 18.2 (1988): 265-89, p. 283 n.2.
[4] Ibid., p. 266.
[5] Arnold B. Arluke, 'Sacrificial Symbolism in Animal Experimentation: Object or Pet?,' *Anthrozoös* 2.2 (1988): 98–117, p. 99.
[6] Ibid., p. 98.
[7] Naomi Klein, *This Changes Everything: Capitalism vs. The Climate* (New York: Simon & Schuster, 2014).
[8] See, for example, Cary Wolfe, *What Is Posthumanism?* (Minneapolis: University of Minnesota Press, 2010).
[9] See Catherine Z. Elgin, 'The Laboratory of the Mind,' in *A Sense of the World: Essays on Fiction, Narrative and Knowledge* ed. Wolfgang Huemer, John Gibson, and Luca Pocci (London: Routledge, 2007), p. 43.
[10] Elgin, p. 43.
[11] Klein, p. 169.
[12] See Mary Louise Pratt, 'Arts of the Contact Zone,' *Profession* (1991): 33-40. See also Mary Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation*, 2nd ed. (New York: Routledge, 2008 [1992]), pp. 6-7.
[13] The shift from colonialism to posthumanism in the understanding of 'contact zones' doesn't imply backgrounding the West's colonial and neocolonial practices. The intersections between colonial and ecological violence have long been recognized in the environmental humanities and are also present in our case studies, particularly VanderMeer's dystopian vision of corporate greed and its consequences. See, for example, Rob Nixon, *Slow Violence and the Environmentalism of the Poor* (Cambridge, MA: Harvard University Press, 2011).
[14] For an example of work that draws together the frameworks of postcolonialism and critical animal studies see, Kathryn Gillespie's 'Placing Angola: Racialisation, Anthropocentrism, and Settler Colonialism at the Louisiana State Penitentiary's Angola Rodeo,' *Antipode* 50.5 (2018), p. 1269.
[15] Donna Haraway, *When Species Meet* (Minneapolis: The University of Minnesota Press, 2007), p. 216. For more on nonhuman contact zones, see Jenny R. Isaacs and Ariel Otruba, 'Guest Introduction: More-than-human Contact Zones,' *ENE: Nature and Space* 2.4 (2019): 697-711.
[16] See Lynda Birke, 'Who—or What—Are the Rats (and Mice) in the Laboratory,' *Society & Animals* 11.3 (2003): 207–24, 214, and Donna Haraway, *Modest_Witness@Second_Millenium. FemaleMan©_Meets_OncoMouse: Feminism and Technoscience* (New York: Routledge, 1997).
[17] In an essay on laboratory animal sacrifice, Alison Christy explicitly develops this symbolism: 'I have plenty of time to observe the crucifixion of a mouse, the insertion of a needle into a heart the size of a jellybean, the blood

spreading out beneath the small body like dark angel wings. Now it seems to me no coincidence that the most famous martyr of all time was not hanged or burned at the stake, but crucified.' Alison Christy, 'Sacrifice: Why Scientists Have to Kill,' *LabLit*, article 394 (2008), np. http://www.lablit.com/article/394.

[18] For more on animal resistance, see Dinesh Wadiwel, 'Do Fish Resist?' *Cultural Studies Review* 22.1 (2016): 196-242.

[19] For a compendium of perspectives on literary experimentation, see Joe Bray, Alison Gibbons, and Brian McHale, *The Routledge Companion to Experimental Literature* (New York and London: Routledge, 2012). For a discussion of 'the experimental' that chimes with our argument, see Natalia Cecire, *Experimental: American Literature and the Aesthetics of Knowledge* (Baltimore: Johns Hopkins University Press, 2019), chapter 5.

[20] For an exploration of VanderMeer's novella that converges with our discussion here, see Shannon Lambert, '"Fingereyed" Description: Laboratory Animals and Transspecies Empathy in VanderMeer and Yanagihara,' *SubStance* 50.3 (2021): 74-92.

[21] Deborah Bird Rose, *Wild Dog Dreaming: Love and Extinction* (Charlottesville: University of Virginia Press, 2011), location 1607.

[22] And not just literature in the conventional sense: Anna Tsing's *The Mushroom at the End of the World*, for example, uses anthropological observation and essayistic writing to perform a very similar switch, placing the titular mushroom within contact zones that emerge from capitalist devastation. See Anna Lowenhaupt Tsing, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (Princeton, NJ: Princeton University Press, 2015).

[23] Eva Hayward, 'Fingeryeyes: Impressions of Cup Corals,' *Cultural Anthropology* 25.4 (2010): 577–99.

[24] For more on the significance of the visual paradigm within (scientific) modernity, see Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, MA: MIT Press, 1990). For the rise of the concept of scientific objectivity in the nineteenth century, see Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2010).

[25] For more on the perceived distance and omniscience of vision and Haraway describes as the 'god trick of seeing everything from nowhere,' see Haraway 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective,' *Feminist Studies* 14.3 (1988), p. 581.

[26] Lynda Birke and Jane Smith, 'Animals in Experimental Reports: The Rhetoric of Science,' *Society & Animals* 3.1 (1995): 23-42.

[27] Karen Joy Fowler, 'Crafting with Ursula: Karen Joy Fowler on Experimental Women, Animals, Science & Story.' Interviewed by David Naimon. *Between the Covers: Conversations with David Naimon*, Tin House Books, 10 April 2022, https://open.spotify.com/episode/3EJFTE7VYuyrr0TKQMth3m?si=Lpz6SPhrTcSDqM_KnuMAWg, 0:15:26.

[28] See 00:20:01 and compare with Vinciane Despret, 'Responding Bodies and Partial Affinities in Human-Animal Worlds,' *Theory, Culture & Society* 30.7-8 (2013): 51-76 and Vinciane Despret, *What Would Animals Say If We Asked the Right Questions?*, trans. Brett Buchanan (Minneapolis: University of Minnesota Press, 2016).

[29] Le Guin in Fowler 2022, 00:26:24.

[30] See Simone Dennis, 'Ambiguous Rats and Ambivalent Mice: Crossing the Great Divides in Scientific Practice,' *Animal Movements - Moving Animals: Essays on Direction, Velocity and Agency in Humananimal Encounters*, ed. by Jacob Bull (Uppsala University: Uppsala University Press, 2011), 75-95; Robert E. Sorge et al., 'Olfactory Exposure to Males, Including Men, Causes Stress and Related Analgesia in Rodents,' *Nature Methods* 11.6 (2014): 629-32; Robert Rosenthal and Reed Lawson, 'A Longitudinal Study of the Effects of Experimenter Bias on the Operant Learning of Laboratory Rats,' *Journal of Psychiatric Research* 2.2 (1964): 61-72.

[31] Minji Kang et al., 'Mental Stress from Animal Experiments: A Survey with Korean Researchers,' *Toxicological Research* 34.1 (2018): 75-81.

[32] Ibid., p. 79. Research on the mental wellbeing of researchers and laboratory technicians working with animals is slowly increasing. See, for example, K. Davies and Lewis Duncan, 'Can Caring for Laboratory Animals be Classified as Emotional Labour?' *Animal Technology and Welfare Journal* 9.1 (2010), 1-6; and Emma Roe and Beth Greenhough 'A Good Life? A Good Death? Reconciling Care and Harm in Animal Research,' *Social & Cultural Geography* 24.1 (2021), 1-10.

[33] Haraway 2007, p. 219.

[34] See, for example, Rosi Braidotti, *Metamorphoses: Towards a Materialist Theory of Becoming* (Cambridge: Polity Press, 2002).

[35] This idea resonates with recent trends in sensory studies. See David Howes, *The Sensory Studies Manifesto: Tracking the Sensorial Revolution in the Arts and Human Sciences* (Toronto: University of Toronto Press, 2022).

[36] María Puig de la Bellacasa, *Matters of Care: Speculative Ethics in More Than Human Worlds* (Minneapolis: The University of Minnesota Press, 2017), p. 20.

[37] Maurice Merleau-Ponty, *Phenomenology of Perception*, trans. Colin Smith (London and New York: Routledge, 2002), p. 127.

[38] Hayward, p. 581.

[39] This reappraisal of touch is one of the main preoccupations of sensory studies: see, for example, Garrington's haptic approach to modernist literature. Abbie Garrington, *Haptic Modernism: Touch and the Tactile in Modernist Writing* (Edinburgh: Edinburgh University Press, 2013).
[40] Roland Barthes, 'The Reality Effect,' in *The Rustle of Language*, trans. Richard Howard (Berkeley and Los Angeles: University of California Press, 1986), pp. 141–48, p. 144.
[41] Elaine Scarry, *Dreaming by the Book* (Princeton: Princeton University Press, 2001).
[42] For more on 'closeness' as an important metaphor in understanding empathetic relations with characters, see Jens Eder, 'Ways of Being Close to Characters,' *Film Studies* 8 (2006): 68–80. It's important to keep in mind that individual readers may respond differently to these stylistic cues, depending on their predisposition and reading strategies or context. For more on differences between readers who tend to visualise and readers who don't, see Ellen J. Esrock, *The Reader's Eye: Visual Imaging as Reader Response* (Baltimore and London: Johns Hopkins University Press, 1993), p. 49.
[43] Marco Caracciolo and Karin Kukkonen, *With Bodies: Narrative Theory and Embodied Cognition* (Columbus: Ohio State University Press, 2021), chapter 3.
[44] Anežka Kuzmičová, 'Presence in the Reading of Literary Narrative: A Case for Motor Enactment,' *Semiotica* 189.1-4 (2012): 23–48.
[45] Here we stress *creative*, since more conventional metaphors are frequently employed in science and scientific discourse. See for example Theodore Brown, *Making Truth: Metaphor in Science* (Chicago: University of Illinois Press, 2008).
[46] Hans Ulrich Gumbrecht, *Atmosphere, Mood, Stimmung: On a Hidden Potential of Literature*, trans. Erik Butler. (Stanford: Stanford University Press, 2012), p. 5.
[47] Also relevant here is Sedgwick's discussion of the close link between affective experience and touch, via the concept of texture. Eve Kosofsky Sedgwick, *Touching Feeling: Affect, Pedagogy, Performativity* (Durham, NC: Duke University Press, 2003). More recently, work in the field of sensory studies has explored the environmental relevance of literary atmospheres. See, e.g., Hsuan L. Hsu, *The Smell of Risk: Environmental Disparities and Olfactory Aesthetics* (New York: New York University Press, 2020).
[48] For more on this concept of 'fingeryeyed' style, with a focus on description, see Lambert 2021. See also the discussion of touch and texture in Marco Caracciolo, *Slow Narrative and Nonhuman Materialities* (Lincoln: University of Nebraska Press, 2022), chapter five.
[49] For more on this dialectic, see Lars Bernaerts, Marco Caracciolo, Luc Herman, and Bart Vervaeck, 'The Storied Lives of Non-Human Narrators,' *Narrative* 22.1 (2014): 68–93.
[50] Tania Hershman, 'Grounded,' In *Some of Us Glow More Than Others* (Norwich: Unthank Books, 2017), pp. 10–25, p. 16. Further excerpts are given as in-text references.
[51] John Berger famously explored the motif of the animal gaze in John Berger, 'Why Look at Animals?,' in *Why Look at Animals?* (London: Penguin, 2009).
[52] See also Shannon Lambert, 'Experimental Bodies: Animals, Science, and Collectivity in Contemporary Short-Form Fiction,' *Studia UBB Philologia* 67.2 (2022): 89-111, p. 101.
[53] Christy, n.p.
[54] Jeff VanderMeer, *The Strange Bird: A Borne Story* (New York: Farrar, Straus and Giroux, 2017), location 143.
[55] Ibid., location 741.
[56] Ibid., location 941-950.
[57] Birke, p. 214.
[58] VanderMeer, location 1145.
[59] Ibid., location 1155.