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Living Knowledges: Empirical Science and the Non-Human Animal in Contemporary Literature

By

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Abstract

In contribution to recent challenges made by animal studies regarding humanist approaches in empirical science, this thesis offers a critical analysis of contemporary literary fiction and its representations of the non-human animal and the human and non-human animal encounters and relations engendered within the scientific setting. This is achieved through a focusing in on four different scientific situations: cognitive ethological field research, long-term cognitive behavioural studies, short-term comparative psychology experimentations, and invasive surgical practices. Sub-divisions of scientific investigation selected for their different methodological procedures which directly dictate the situational circumstance and experience of non-human animals involved to produce particular *kinds* of knowledges on them.

The thesis is divided into four chapters, organised into the four sub-divisions of contemporary scientific modes of producing knowledge on non-human animal life and the distinct empirical methodologies they employ. The first chapter provides an extended analysis of William Boyd's *Brazzaville Beach* (1990), using Donna Haraway's conceptualisations of the empirical sciences as socially constructed to examine how the novel offers a reconsideration of field-based scientific practices and the interspecies encounters engendered there. The second chapter moves to the laboratory setting as reconstructed in both Colin McAdam's *A Beautiful Truth* (2013) and Karen Joy Fowler's *We Are All Completely Beside Ourselves* (2014), employing Bruno Latour's theoretical deconstructions of the physical and conceptualised laboratory setting to reconsider how fictional instances can explore human and non-human encounters whilst navigating the situational circumstances of the space. The third chapter offers an analysis of Lydia Millet's 'Love in Infant Monkeys' (2009), Karen Joy Fowler's 'Us' (2013), and Ursula Le Guin's 'Mazes' (1975), three texts exploring conceptual oppositions apparent within experimental cognition studies, read against Vinciane Despret's considerations of the experimental situation as influential over human and non-human animal encounters. Finally, the fourth chapter reads Sylvia Torti's *Cages* (2017) and Allegra Goodman's *Intuition* (2010) as fictional examples of invasive scientific practices reliant on the non-human animal body as biomaterial, using Jane Bennett's equalising vital materiality theory to re-balance these interspecies encounters in order to inform an effective evaluation of the epistemological logics at play against those fictionally represented.

Taken together, these chapters enable the thesis to look across different scientific settings and attend to the specificities of each empirical situation, thereby contributing to the store of literary animal studies accounts regarding the empirical sciences and human and non-human animal relation in fiction by adding complexity and comparative understanding. Rather than survey many instances in contemporary literary fiction to achieve its goals, the thesis focuses on important texts in detail because of the depth and focus of their interest in alternative scientific settings. The chapters showcase different literary strategies by which to navigate subtle nuances and variances between epistemological logics and empirical methodologies, opening up the scientific setting to consider the non-human animal experiential situation and the human and non-human animal encounters and interactions that occur there.

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'*Sometimes I sits and thinks, and sometimes I just sits.*'

- A. A. Milne

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Introduction

> Man may be excused for feeling some pride at having risen, though not through his own exertions, to the very summit of the organic scale; and the fact of his having thus risen, instead of having been aboriginally placed there, may give him hopes for still a higher destiny in the distant future. But we are not here concerned with hopes or fears, only with the truth as far as our reason allows us to discover it. I have given evidence to the best of my ability; and we must acknowledge, as it seems to me, that man with all his noble qualities, with sympathy which feels for the most debased, with benevolence which extends not only to other men but to the humblest living creature, with his god-like intellect which has penetrated into the movements and constitution of the solar system – with all these exalted powers – Man still bears in his bodily frame the indelible stamp of his lowly origin.[1]

The excerpt above is the final paragraph taken from Charles Darwin's *The Descent of Man*, representative of the textual moment Darwin formally applied his theory of species evolution to humanity.[2] First published in 1871, the behemothic work is a study of many correlations existent between the physical and psychological evolutionary development of humankind and other non-human animal species, as well as a demonstration of evolutionary theory in human society as a civilized approach to natural selection. Darwin's ending summation is both equally idealistic and optimistic in its proposed application of evolutionary theory, depicting a veritable utopia where humans and non-human animals coinhabit a world of discoverable universal truths. However, Darwin's propitious epilogue was ultimately interpreted differently by those in the contemporary scientific community. Religious assuredness in man's celestial favour was instead traded for a sense of evolutionary pride that justified resultant anthropocentric approaches that would

[1] Charles Darwin, *The Descent of Man and Selection in Relation to Sex* (Ware: Wordsworth Editions Limited, 2013), pp. 646-647.

[2] A broad and valuable account of the philosophical nature and impact of Darwin's evolutionary theory is provided in Michael Ruse's *Charles Darwin* (Oxford: Blackwell Publishing, 2008).

characterise the empirical sciences through into the next century and beyond.[3] During the intermediary period, models of knowledge pertaining to human exceptionalism abounded to establish a species hierarchy, at the summit of which humanity assuredly placed itself. The intellectual powers of the empirical sciences were mobilized and turned to non-human animals to better understand human evolutionary history, to determine a range of possible futures, and most importantly, to reassure the higher destiny of man.

The extract from *The Descent of Man* introduces main epistemological logics still at play within modern-day practices of scientific knowledge production, specifically those that use non-human animals. Darwin's allusion to there being a 'truth as far as our reason allows us to discover it', demarcates systems of self-appropriation and deliberate selectivity in empirical methodological design. The 'exalted powers' of man, particularly his exclusive intellectual prowess and linguistic capabilities, are benchmarks of sentience by which non-human animal species are measured, categorized, and qualified within a species hierarchy that additionally determines human 'benevolence', distinctions that include scientific attitudes and treatments toward non-human animals. Confidence in human exceptionalism continued to influence the direction of empirical sciences well into the twentieth century, invigorated by scientific and technological advances. However, fractures in the ideology began to emerge, as scientist Sir James Jeans demonstrates in 1933: '[n]ature no more models her behaviour on the muscles and sinews of our bodies than on the desires and caprices of our minds'.[4] Gradually, scepticism toward human exceptionalism began to pervade the empirical sciences, influencing perceptions of the non-human animal used in its experimentations, prompting reconsiderations of its psychological and corporeal experience. However, the post-war era brought economic, scientific, and technological advances once again, increasing the quantity of non-human animals used in laboratories, facilities, and researches throughout the world, a self-governing space on the periphery of the public domain and legally protected.

These cultural and economic shifts established a resident non-human animal population entirely dependent on its interspecies relationship with humans, creating a vast multiplication and multiplicity of human and non-human animal encounters in the empirical scientific setting

[3] A historical overview of philosophical movements in empirical science is provided in Steve Fuller's *Science* (Buckingham: Open University Press, 1997).

[4] James Jean, *The New Background of Science* (London: Cambridge University Press, 1933), p. 43.

almost entirely invisible to the outside world. Recently, cross-disciplinary efforts by historians and sociologists of science with an interest specifically in non-human animals have sought to revisit and reconsider the empirical designs and methodologies used in contemporary empirical science that employ non-human animals, exposing and examining conceptual oppositions evident during human and non-human animal encounters occurrent there, to then question broader ethical and moral implications. In order to expand our understanding of the kinds of conceptual oppositions present in the epistemological logics of science and the influences of human exceptionalism that underpin all scientific empirical experimentations, it is beneficial to turn to the important work of Jacques Derrida.

During an interview recorded in 1989, conducted by fellow philosopher Jean-Luc Nancy, Jacques Derrida considered the 'question of the animal' as an oppositional by-product of converse determinations of the human relation to self, idealised to be an entity capable of conscience, awareness, language, and having an understanding of death.[5] Derrida's later work *The Animal That Therefore I Am*, entitled after the extensive essay he wrote and delivered to the 1997 Cerisy Conference, is considered a significant event in the history of animal studies that worked to re-complicate concepts of the non-human animal. Considering philosophical difficulties and queries relating to the non-human animal, Derrida examines humanist distinctions of what is deemed *human* and what is deemed *non-human*, and why their resultant misconceptions of ontological difference between them are so dogmatically maintained. Examining the limitations of these distinctions and the potentialities that are presented when one considers constructive interstices between them, Derrida uses the term "limitrophy" to define the method of his philosophical exploration into these lines of distinction:

> *Limitrophy* is therefore my subject. Not just because it will concern what sprouts or grows at the limit, around the limit, by maintaining the limit, but what *feeds the limit*, generates it, raises it, and complicates it […] not in effacing the limit, but in multiplying its figures, in complicating, thickening, delinearizing, folding, and dividing the line

[5] Jacques Derrida, '"Eating Well", or the Calculation of the Subject: An interview with Jacques Derrida', in *Who Comes After the Subject?*, ed. by E. Cadava and others (London: Routledge, 1991), pp. 96-119 (p. 105).

> precisely by making it increase and multiply […] the limit between Man with a capital M and Animal with a capital A.[6]

Derrida identifies several ontological points along the human and non-human animal limit that he works against in order to reconsider the artificiality of the human and non-human animal binary, including thought and language. He ascertains that distinctions between what is determined to be human and what is determined to be non-human are detrimentally reductive, incapable of encapsulating the diverse complexities of non-human animal species in their entirety. *The Animal That Therefore I Am* offered a conceptual framework by which to find interstices, inconsistencies, and spaces along the human and non-human animal border with the potential for constructive reconsideration of the non-human animal experience. By employing Derrida's interrogative framework, it is possible to undermine and think beyond unquestioning anthropocentric systems and challenge humanist demarcations of the non-human animal to reconsider its role in literature, science, and other instances in human culture. However, before any such investigative contribution can be carried out it is important to briefly assess the history of the two cultures debate that has recently dominated the intellectual relationship and interactions between literature and empirical sciences.

In May 1959, scientist and novelist C. P. Snow delivered his now infamous Rede Lecture at the University of Cambridge entitled 'The Two Cultures', published later in that same year under the same title. Snow outlined his fear that 'the intellectual life of the whole of western society is increasingly being split into two polar groups'.[7] He continued to describe the sciences and the humanities as becoming 'two groups – comparable in intelligence, identical in race, not grossly different in social origin […] who had almost ceased to communicate at all, who in intellectual, moral and psychological climate had so little in common'.[8] He asserted that '[t]his polarisation is sheer loss to us all. To us as people, and to our society […] practical and intellectual and creative loss', claiming that the polarisation had been further exacerbated by 'incomprehension on both sides'.[9] After sketching out the ideological and methodological

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[6] Jacques Derrida, *The Animal That Therefore I Am*, ed. by Marie-Louise Mallet, trans. by David Wills (New York: Fordham University Press, 2008), p. 29.

[7] C. P. Snow, *The Two Cultures* (Cambridge: Cambridge University Press, 2008), p. 3.

[8] *Ibid.*, p. 2.

[9] *Ibid.*, p. 11.

features of the sciences and the humanities disciplines, Snow suggested ways in which this divergence could be halted and bridge the chasm between two groups to the advantage of western society, including educational reform and the positive effect of new emergent mid-century technologies. However, the 'two cultures' concept was seized upon and vehemently adopted by those who identified with their chosen intellectual faction, building on increasing tensions and debates regarding knowledge and cultural and human values that had arisen throughout the early twentieth century. Following Snow's lecture, these conflicting positions were catalysed into the two cultures debate that ensued throughout the 1960s and eventually cemented the tribalism that defined, and continues to define, the relationship between the sciences and humanities today.

Cultural historian Guy Ortolano observes that the 'two cultures' debate has proliferated from the moment of Snow's 1959 lecture, and that its reverberations still resonate today 'in accounts of popular science, public policy, the sociology of knowledge, postwar British history, intellectual story – and much else besides'.[10] Crucially he proposes that, on both sides, there remains an 'ability of commentators to adapt the "two cultures" to various ends [and so] many of these discussions tend to recycle their claims […] The recirculation of such clichés results from the multiplicity of conversations taking the "two cultures" are their touchstone: they may share a common point of departure, but they lack a common body of knowledge'.[11] In his monograph *The Two Cultures Controversy*, Ortolano argues that, although the 'two cultures' debate is predominantly seen as a disciplinary dispute, it was in fact an ideological clash over key fundamental ideological stakes available during the period, mainly Britain's past, present and potential postwar future.[12] He summaries how Snow's 'two cultures' demarcation has passed into the tribalist folklores of both disciplines, and is today a cliché about intellectual life that conceptually intrudes in on and unnecessarily complicates any crucial discussions concerning the relationship between the humanities and the sciences due to the intellectual history that the two cultures debate sustains. Patricia Waugh emphasises this point further and offers a commentary on the condition of the two cultures debate today, noting:

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[10] Guy Ortolano, 'The literature and the science of 'two cultures' historiography', *Studies in History and Philosophy of Science*, 39 (2008), 143-150 (p. 144).

[11] *Ibid.*, p. 149.

[12] Guy Ortolano, *The Two Cultures Controversy: Science, Literature and Cultural Politics in Postwar Britain* (Cambridge: Cambridge University Press, 2009).

> Academic interest in the relations between the sciences and the humanities has never been so high as now, enhanced and nourished by the rise of the new disciplines such as Science Studies and the growth in history and philosophy of science. But no major discussion of the relation between the arts, humanities and sciences has since proceeded without some positioning of itself in relation to the conceptual space up by Snow's phrase.[13]

Waugh goes on to recommend that any attempt to understand the two cultures debate should 'instead offer an opportunity for a "creative collaboration" between disciplines, in attempting to arrive at a properly complex and multi-perspectival understanding', to prevent discussions that have 'too often metamorphosed into further disciplinary skirmishes'.[14] When considering the two cultures debate in regard to the state of human and non-human animal relations, discussions invariably become entrenched within the same ideological ruts as the broader discourse. Critically, there is no significant examination of how the two cultures debate has affected and continues to influence considerations of human and non-human relations more broadly or, specifically in relation to the purposes of this thesis, deliberations of human and non-human encounters within the scientific empirical environment. Therefore, it is beneficial to consider the state of the scholarship on science and literature to demonstrate this gap in the literary analysis to reiterate the potential value such investigations could bring.

Scholarship on science and literature lacks any comprehensive focus on contemporary representations of human and non-human animals in empirical scientific settings. During his introduction to *The Cambridge Companion to Literature and Science*, Steven Meyer describes an anthology that provides 'a rich portrayal of the interweaving of theory and practice in recent scholarship'.[15] Meyer identifies Snow's Rede Lecture as the moment of genesis for the current scholarship in science and literature and so introduces a 'compelling account of how twenty-first-century literary studies and science studies have come to be so richly integrated with literature

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[13] Patricia Waugh, review of Guy Ortolano, *The Two Cultures Controversy: Science, Literature and Cultural Politics in Postwar Britain* (2009), *Reviews in History*, 849 (2009) <https://reviews.history.ac.uk/review/849> [accessed 3 February 2020]

[14] *Ibid.*

[15] Steven Meyer, 'Introduction', in *The Cambridge Companion to Literature and Science*, ed. by Steven Meyer (Cambridge: Cambridge University Press, 2018), pp. 1-22 (p. 1).

and science, and may become still more so'.[16] In the preface to *The Routledge Companion to Literature and Science*, edited by Bruce Clarke and Manuela Rossini, the anthology claims to highlight 'specific specializations with regard to their literary connections', and provide details regarding 'the current range of disciplinary and theoretical approaches in and around literature and science scholarship'.[17] Indeed, one review describes the anthology as 'a defining moment in the consolidation of transdisciplinary convergences […] a postmodern text about literary cross-disciplinary contact zones'.[18] However, not one of the contributories in either companion address the potential to be found in *contemporary* representations of human and non-human animal encounters and relations within the modern empirical scientific setting. As such, the importance of an intervention that examines an area of valuable interdisciplinary crossover becomes all the more apparent when considering this critical omission.

Until very recently, the majority of investigations regarding the relationship between literature, science and human and non-human animal encounters focus predominantly on either Darwin's language and rhetoric, focusing on the formation of evolutionary theory and modern scientific practice. Those that do consider the non-human animal situation in the scientific environment specifically do so through instances taken from pre-modern fiction. Chris Danta examines how the metaphysical relations between vivisection and non-human animal life are presented throughout the works of both Darwin and Robert Lewis Stevenson.[19] Manon Mathias considers thematics of reincarnation in literature by George Sand in the Victorian period.[20] Sally Shuttleworth looks to uncover networks which operated within Victorian science and medicine, though omits the role played by non-human animals during this period of scientific genesis.[21] Angelique Richardson explores levels of interdisciplinarity brought on by Darwin's research into

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[16] *Ibid.*

[17] Bruce Clarke and Manuela Rossini, 'Preface', in *The Routledge Companion to Literature and Science*, ed. by Bruce Clarke and Manuela Rossini (Abingdon: Routledge, 2011), pp. xv-xviii (p. xvii).

[18] Jonathan Zilberg, 'Review: The Routledge Companion to Literature and Science by Bruce Clarke and Manuela Rossini', *Leonardo*, 46 (2013), 300-302 (p. 301).

[19] Chris Danta, 'The Metaphysical Cut: Darwin and Stevenson on Vivisection', *Victorian Review*, 36 (2010), 51-65.

[20] Manon Mathias, 'Pre-Darwinian Species Change: Reincarnation and Transformism in George Sand's Évenor et Leucippe', *Journal of Literature and Science*, 11 (2018), 33-49.

[21] Sally Shuttleworth, 'Life in the Zooniverse: Working with Citizen Science', *Journal of Literature and Science*, 10 (2017), 46-51.

emotions, focusing on how it challenged traditional epistemological distinctions between the human and non-human animal in Victorian culture.[22] This brief cross section of traditional research into the relationship between literature and the sciences reiterates the importance of an analytical intervention that examines an area of such valuable interdisciplinary crossover in contemporary literary representations of human and non-human animal encounters in scientific spaces reemphasises the necessary intervention of this thesis.

In contribution to recent challenges made by animal studies of the same humanist approaches outlined earlier, this thesis offers a critical analysis of representations of non-human animals and the human and non-human animal encounters and relations engendered within scientific settings as represented in contemporary literary fiction, achieved through a focusing in on four different scientific situations. These are: cognitive ethological field research, long-term cognitive behavioural studies, short-term comparative psychology experimentations, and invasive surgical practices. These sub-divisions have been chosen deliberately for their entirely different methodological procedures which directly dictate the situational circumstance and experience of the non-human animals involved. Additionally, each scientific setting works toward the promissory future of advancing either human biological health or understanding of human physiological or psychological evolutionary development. Therefore, these four settings represent a set of interspecies spaces existent on the human and non-human animal boundary where appropriations of human exceptionalism manifest themselves in four uniquely different ways. Each chapter spends time appropriately setting out the key scientific contexts of each scientific situation critiqued by the contemporary fictional instances, particularly through representations of each methodological practice and the non-human animals employed within them. Considerations will now turn to the works of Philip Armstrong, Cary Wolfe, and Susan McHugh, prominent literary critics whose systematic engagements with literature and non-human animals that deal extensively with both contemporary literature and empirical science.

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Philip Armstrong's *What Animals Mean in the Fiction of Modernity* addresses issues regarding representation of the non-human animal in literature by interrogating modern

[22] Angelique Richardson, *After Darwin: Animals, Emotions, and the Mind* (Amsterdam: Rodopi, 2013).

frameworks of humanist representations of non-human animal life. Throughout, he identifies textual instances of animal agency representative of dominant human cultural perspectives, arguing that fictional non-human animals began to permeate these human and non-human boundaries and question the distinctions between them. Armstrong identifies René Descartes' philosophical outline of scientific methodology in *Discourse on the Method*, first published in 1637, which proclaims the aptitude to think is the uniquely human precondition that conversely denies non-human animals intelligence, self-consciousness, and thought; rendering them automata or mechanomorphic.[23] He argues that Descartes' proclamation, accompanied by the scientific and technological advances, caught the human cultural and social imagination of the early modern era and set the standard by which non-human animals were perceived and therefore represented.[24] Armstrong's intention in *What Animals Mean* is to explore instances in literature that depict 'the relationship between human-animal narratives and the social practices and conditions from which they emerge; the evidence of exchanges between human and non-human forms of agency'[25], his objective being to 'facilitate a mode of analysis that does not reduce the animal to a blank screen for the projection of human meaning, and might offer productive new ways of accounting for the material influence of the non-human animal upon humans, and *vice versa*'.[26] Importantly, Armstrong determines 'novelists, scientists and scholars can never actually access, let alone reproduce, what other animals mean on their own terms […] only represent animals' experience through the mediation of cultural encoding […] a reshaping according to our own intentions, attitudes and preconceptions'.[27]

Critical approaches viewing empirical science as a social practice influenced by current human cultural situations are not new, especially within the field of critical animal studies. It is therefore surprising that there have not been any kind of substantial critical engagements with the ways in which contemporary literature represents these social processes of empirical science. Including how methodologies implicate and influence the experience of the non-human animal used within empirical practices, and how they are represented throughout. Armstrong's

[23] René Descartes, *A Discourse on the Method of Correctly Conducting One's Reason and Seeking Truth in the Sciences* (Oxford University Press, 2008).

[24] Philip Armstrong, *What Animals Mean in the Fiction of Modernity* (Abingdon: Routledge, 2008), p. 7.

[25] *Ibid.*, p. 2.

[26] *Ibid*., p. 3.

[27] *Ibid.*, pp. 2-3.

processes of cultural encoding, as well as the forms of human and non-human animal agency involved, represent a sequence of investigative potentialities that support the exploratory objectives of the thesis. Taking Armstrong's considerations even further, this thesis explores the capability of contemporary literature to portray scientific experimental design, including the influence of the investigator's own intentions, attitudes, and preconceptions, as indicative of a human social practice influenced by current human cultural inclinations. More specifically, how empirical practices are wholly humanist constructions that maintain species distinctions by observing, recording, exploiting, representing and misrepresenting the non-human animal in particular ways, creating specific *kinds* of knowledge on non-human animal life that are then considered to be universal truths.

Cary Wolfe, a prominent figure in critical posthumanist approaches of animal representation, advocates the potential that comes into being when the non-human animal is taken seriously in readings of literature, science, and other human cultural practices:

> Once we understand that '*the* human' and '*the* animal' are relics of a philosophical humanism that flattens the actual complexity and multidimensionality of what are, in fact, many different ways of bring in the world that are shared in myriad particular ways across species lines, then the question of the animal – and of the animality of the human – cannot help but open onto fundamental issues that are best thought of not as problems of distinct and discreet ontological substances, but rather in terms of processes, dynamics and relations […] and the environments, technologies, prostheses, and practices in which they are embedded as beings both acting and acted upon.[28]

Throughout his researches, Wolfe endeavours to deconstruct systems that maintain human subjectivity and reinforce boundaries built on species identity, arguing that scientific discoveries of non-human animal conscious awareness, social hierarchies, and behaviours actually destabilise distinctions between the human and non-human animal, drawing them closer together.[29] He

[28] Cary Wolfe, 'Moving forward, kicking back: The animal turn', *Postmedieval: A Journal of Medieval Cultural Studies*, 2 (2011), 1-12 (p. 3).

[29] Florence Chiew, 'Posthuman Ethics with Cary Wolfe and Karen Barad: Animal Compassion as Trans-Species Entanglement', *Theory, Culture and Society*, 31 (2014), 51-69 (p. 54).

highlights the illogicality behind ethical care and treatment of non-human animals being totally determined by the same scientific systems of knowledge production that utilise them, proposing reviews of current legislative doctrine to accommodate ontological complexities.[30] He outlines the difficulties of isolating and determining the non-human animal experience in the scientific setting, falling into a category of interspecies cohabitation that is dictated by the epistemological logics operational there. He stresses that although 'some nonhuman animals have their own social relations of interdependency […] others live in relations of interdependency with human beings'.[31] When considering the absolutism of empirical science to represent the non-human animal, he determines that a 'disarticulation of reference and truth' happens, as 'science uses conceptual abstractions that do not do justice to the observed system's concrete knowledge of its milieu or to its ongoing self-experience'.[32]

Alternatively, Wolfe underlines that recent contemporary animal studies efforts have been encouraged by scientific discoveries into the richness of non-human animal emotional lives and complex cognitive abilities, made apparent through their various non-linguistical forms of communication and interaction between themselves, and even across species lines.[33] Throughout his book *Animal Rites*, Wolfe consistently employs references to scientific researches to support critical animal studies efforts that dissolve humanist lines of human and non-human animal distinction. For example, he contends that 'any number of very prominent studies in field ecology, cognitive ethology, and linguistic production […] [have shown] the "defining" characteristics of the distinctly human – language, tool use, took making, social behaviour, altruism, and so on – have been found to be not so defining after all'.[34] In doing so, Wolfe conversely implies that animal studies as a field has been enabled by taking the non-human animal in science seriously, including discoveries into their biological and cognitive abilities. If critical animals studies investigations are indeed initiated by scientific enquiry and its subsequent results, it is again a substantial gap in scholarship that there is no significant literary critical

[30] Cary Wolfe, *Animal Rites: American Culture, the Discourse of Species, and Posthumanist Theory*, (Chicago: University of Chicago Press, 2003), pp. 190-191.

[31] Cary Wolfe, *Before the Law: Humans and Other Animals in a Biopolitical Frame* (Chicago: The University of Chicago Press, 2013), p. 19.

[32] Cary Wolfe, *What is Posthumanism?* (Minneapolis: University of Minnesota Press, 2009), pp. 113-114.

[33] Cary Wolfe, 'Human, All Too Human: "Animal Studies" and the Humanities', *PMLA*, 128 (2009), 564-575 (p. 567).

[34] Cary Wolfe, *Animal Rites*, p. 40.

engagement with the ways in which literary practices represent those same scientific systems of producing knowledge on non-human animals. Exploratory potentialities include how contemporary fiction explores the limitations of scientific investigation outlined by Wolfe, a touchstone of posthumanist animal studies investigations, through the portrayal of non-human animals and the empirical spaces they inhabit. Does contemporary literature portray empirical science as an epistemological system that dissolves human and non-human animal distinctions? And importantly, how does literature depict the non-human animal experience in the scientific setting and the ways in which empirical methodologies delineate the human and non-human animal encounters that occur there.

Susan McHugh considers representations of non-human animals in literature, visual media, and scientific narratives, maintaining that literary animal studies can 'realize an empirical potential to develop terms, methods, and concepts of species relations […] [and] address the looming epistemological crisis of disciplinary ways of knowing'.[35] She contends that recent analyses of the literary non-human animal have undermined more scientific ways of knowing both non-human animals and the human and non-human animal relationship more broadly. In *Animal Stories: Narrating Across Species Lines*, McHugh examines how literature and literary narratives help in 'mapping more permeable species boundaries […] locating narrative as a zone of integration', and 'how story forms operate centrally within shifting perceptions of species life'.[36] *Animal Stories* evidences literary novelistic instances that unsettle views of literary fiction as the embodiment of human subjectivity, instead encouraging a sense of reciprocal interspecies connectivity and social agency that influence considerations of the non-human animal across the humanities and science subjects. Similarly to Armstrong, McHugh contends that throughout animal studies today 'animals are being reconceptualised as active participants in all sorts of cultural production', including the empirical sciences, and ultimately benefit from an '[a]nalysis of the varied involvements of animals in the production of disciplinary and other knowledges', including considerations of 'animals as significant others in science studies'.[37] This specific set of

[35] Susan McHugh, 'One or Several Literary Animal Studies?' <https://networks.h-net.org/node/16560/pages/32231/one-or-several-literary-animal-studies-susan-mchugh> [accessed 26 August 2019]

[36] Susan McHugh, *Animal Stories: Narrating Across Species Lines* (Minneapolis: University of Minnesota Press, 2011), p. 2.

[37] Susan McHugh, 'Literary Animal Agents', *PLMA*, 124 (2009), 487-495 (p. 490).

deliberations align closely with key sociology of science theories that reconsider science as a social activity and the knowledges produced influenced by the context in which it is created. Such analytical strategies are greatly influential throughout this thesis, opening up the empirical sciences in such a way as to offer opportunities to reconsider the role and experience of the non-human animals used in the production of knowledge.

Whilst she promotes 'animal fictions as models enabling significant epistemological shifts within animal science', McHugh also proclaims that these texts do so through '[o]bscuring the more mundane realities of data-driven science'.[38] However, as she offers no comprehensive critical analyses of non-human animals in the scientific setting as represented in contemporary literature, this assertion cannot be considered true of all fictional literary strategies. This is another key investigative objective of the thesis: whether literary representations of non-human animals in the scientific setting initiate reconsideration through obscuring and concealment as McHugh suggests, or other strategies that also promote a sense of anthropological distance and estrangement from empirical practice. When they are found not to be, literary strategies are examined in terms of how they navigate the epistemological logics inherent to empirical methodological designs to ensure effective reconsideration of the non-human animal implicated within them. McHugh's approaches additionally implicate a series of further questions regarding literary representations of non-human animal as participatory in the construction of scientific knowledge, how they potentially affect both the research and the researcher conducting the investigation to influence both the non-human animal encounter and the final results that are obtained.

The following chapters investigate the ways in which contemporary literary fiction reconsiders the non-human animal in empirical scientific systems of knowledge production to suggest a far more multi-dimensional interspecies encounter than traditional perceptions of empirical science would otherwise suggest. Operating in between literature and historiographical or sociological and theoretical studies of science, the thesis takes literary non-human animals seriously as both a participatory contributor in the construction of scientific knowledge and the numerous human and non-human animal encounters created by and through empirical practices. While this approach necessarily opens up truth-claims of scientific epistemologies and practices for critical reflection, it is certainly not the objective of this thesis to determine the overall

[38] McHugh, *Animal Stories*, p. 212.

effectiveness of scientific empirical practice to produce knowledge on non-human animals. Rather, it is to evaluate how contemporary literature contributes to and commentates on reconsiderations of systems of knowledge production, always operating at the outer limits of scientific methodology. This allows the thesis to discover other valuable ways of thinking about non-human animals in the scientific empirical setting, rebalancing humanist organizations of agency, and consider how epistemological logics dictate their experiential existences.

With the purpose of guaranteeing an efficient and systematic study, and to facilitate the interdisciplinary nature of such an investigation, all four chapters are built on an investigative framework that comprises of two methodological features. Firstly, and as outlined earlier, each chapter focuses on a particular sub-field of empirical science that employs non-human animals: field-based research, long-term cognitive behavioural and biomedical studies, short-term comparative behavioural psychology experimentations, and invasive surgical practices such as vivisection and dissection. The purpose is to identify the subtle methodological nuances that influence animals' experience in a variety of scientific situations where epistemological logics perhaps seem similar but actually operate entirely differently. Secondly, each chapter is supplemented by the conceptual approaches of Donna Haraway, Bruno Latour, Vinciane Despret, and Jane Bennett, respectively. This selection of historical, philosophical, and sociological approaches to the non-human animal in the scientific environment are able to deconstruct and critique empirical methodologies and identify critical conceptual oppositions within them that can then be employed to identify correlative investigations of the same within the literary material. By establishing a dialogue between the contemporary literature and these secondary materials in this way a far more comprehensive investigation into the epistemological workings of empirical science can be carried out, an examination that is more inclusive of the various *ways* in which empirical science employs non-human animals to produce different *kinds* of knowledges, as well as re-complicating and accentuating non-human animal presences within empirical systems that are otherwise represented only in scientific terms.

Accordingly, the remainder of this introduction is dedicated to identifying and outlining critical approaches of additional contemporary works that examine and reconsider the non-human animal used in empirical systems of knowledge production, particularly those attending to conceptual oppositions apparent within empirical methodology. Considerations turn to theoretical approaches relating to the empirical sciences, particularly sociological and historical

reviews of science and its technologies, to find helpful deconstructive approaches that isolate the characteristics of scientific empiricism involving non-human animals to facilitate the ensuing analyses of literary fiction in the thesis. Finally, the introduction concludes with a brief summary of the fictional texts, including the mediatory theoretical approaches and the epistemological characteristics to be addressed within each of the thesis chapters.

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In addition to being an integral feature in the selected fictional literary materials of this thesis, empirical research plays an essential role in the production of knowledge pertaining to non-human animal life. These sequentially initiate and sustain the same discourses that influence cultural perceptions and understandings of non-human animals in return. For example, Jane Goodall's discovery of tool use amongst chimpanzees in the Gombe Stream National Park in 1960 directly challenged and displaced long-established beliefs that exclusively only humans could fashion and operate tools. Inversely, discoveries that mice were virtually genetically identical to humans in the twentieth century appropriated their vastly extensive use throughout the empirical sciences as a biological model and, after the development of cloning in 1998, encouraged perceptions of disposability and low ontological value. Critically, these same cultural perceptions infuse literary reconsiderations of non-human animals in the empirical sciences, and so it is worth turning to approaches that neutralise and rebalance preconceptions of non-human animals used in the scientific setting.

During her landmark study *Primate Visions*, sociologist of science Donna Haraway précises the constructively sceptical potential of posthumanist approaches, taking non-human animals in empirical science seriously though specifically in primatological field narratives. Haraway aptly summarises the numerous potentialities extant in human and non-human animal encounters and interactions that occur within the scientific empirical environment and the systems of knowledge production that are operational there:

> The animals are active participants in the constitution of what may count as scientific knowledge […] the animals resist, enable, disrupt, engage, constrain, and display. They act and signify, and like all action and signification, theirs yield no unique, univocal, unconstructed "facts" waiting to be collected […] [they] are not transparent; they are dense. Like words, machines, equations, institutions, generic writing conventions,

> people, and landscapes, the animals have specific kinds of solidity in the apparatus of bodily production.[39]

Regarded by many as one of the foundational interdisciplinary work of animal studies, Haraway's investigation purports scientific knowledge to be socially constructed and representations of non-human animal lives within it accommodative of imperceptible political and cultural influences.[40] Resultantly, Haraway's deconstructive approach illuminates the anthropocentric approaches of scientific empiricism, particularly how scientific movements are built upon particular social and political situations and therefore relevant only in the context of that particular epistemological episode. Later in *When Species Meet*, a posthumanist rethinking of the human and non-human animal relationship through an expansion of what constitutes 'companion species' and the ontological opening this subsequently offers, Haraway identifies what she terms as interspecies 'contact zones'.[41] Defining science as a prominent contact zone, Haraway reconsiders the crucial role played by the non-human animal in empirical designs used for knowledge production, '[t]aking animals seriously as workers without the comforts of humanist frameworks for people or animals'.[42] During her investigation, Haraway explores instrumental relations, complicated even further by human systems of appropriation and self-justification.

However, *Primate Visions* does not elaborate on the various epistemological modes of empirical investigations, as Haraway applies her conceptual approaches only to field-based primatology, encouraging a consideration of the constructive potentialities in applying her posthumanist approaches to other empirical methodologies using non-human animals. Though valuable for Chapter One, by elaborating Haraway's approaches further the thesis ponders implications of an interspecies contact zone within other empirical settings, such as the laboratory, as well as participatory contributions made by non-human animals during the production of scientific knowledges. Such a strategy views the empirical practices of the laboratory as being socially constructed with the same anthropocentric leanings as any other

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[39] Donna Haraway, *Primate Visions: Gender, Race, and Nature in the World of Modern Science* (London: Routledge, 1989), pp. 310-311.

[40] Anne Fausto-Sterling, 'Essay Review: Primate Visions, A Model for Historians of Science?', *Journal of the History of Biology*, 23 (1990), 329-333.

[41] Donna Haraway, *When Species Meet* (Minneapolis: University of Minnesota, 2008), p. 2.

[42] *Ibid.*, p. 73.

empirical science. Haraway's reflections also rebalance systems of agency during productions of scientific knowledge to propose non-human animals are not simply objects with easily discoverable universal truths, but complex subjects that re-complicate an affective human and non-human animal encounter within scientific settings. When utilised to analyse instances in contemporary literature, such approaches can re-complicate the literary non-human animal to view it as an active contributor during the production of scientific knowledge and reconsider its role.

Matthew Calarco expounds Haraway's approach to deliberate on the situational settings of non-human animals in the modern world and the assortment of environments in which the human and non-human animal encounters occur: 'when we view the world in terms of classical human/animal distinctions, we fail to see the complicated lines of mutual affect and relation that traverse human-animal interactions […] animal lives, individuals, species, and other affects are found throughout those many arenas of human life that are thought to be exclusively human'.[43] Inverting Derrida's deconstruction of classical forms of human and non-human animal species distinction, Calarco contends that spaces that host interspecies encounters benefit from considerations of species *indistinction*. Nevertheless, Calarco suggests moving the definition of the human 'downward from the magisterial heights of human superiority and outward toward an essentially nonhuman and inhuman zone', through a process he calls 'thinking from within the space of indistinction'.[44] For Calarco, the value of harnessing this approach lies in bringing non-human animals within the scope of ethical and political contemplations through means of species association.[45]

Throughout his book *Zoographies*, Calarco questions the human and non-human animal binary because its upholding ontological features are being continuously disproved by the sciences and other animal studies efforts currently.[46] It is therefore again remarkable that a comprehensive critical study has yet to examine contemporary literary representations of the

[43] Matthew Calarco, 'Identify, Difference, Indistinction', *The New Centennial Review*, 11 (2011), 41-60 (p. 51).

[44] *Ibid.*, p. 56.

[45] Matthew Calarco, 'Thinking through Animals: Reflections on the Ethical and Political Stakes of the Question of the Animal in Derrida', *Oxford Literary Review*, 29 (2007), 1-15 (p. 4).

[46] Matthew Calarco, 'Zoographies: The Question of the Animal from Heidegger to Derrida' (New York: Columbia University Press, 2008).

non-human animal within the scientific setting, especially as they can consider contrasting perceptions of it being the task of scientific endeavours to prove and therefore reinforce lines of distinction between the human and non-human animal. As with Haraway, the thesis builds on the theoretical approaches outlined here by Calarco and repurposes them to frame its examinations of contemporary literature's aptitude to catalyse the same kinds of reconsideration of non-human animal agency in encounters within the scientific setting, particularly whether or not they choose strategies of distinction or indistinction to achieve re-evaluation of the non-human animal experience existent there.

Any discussion concerning non-human animals becomes invariably a discussion on non-human animal minds and stylistic strategies used to represent them throughout both the sciences and literature. Writing at the end of the twentieth century, zoologist Donald Griffin offered a reconsideration of non-human animal mental capacities.[47] He proposed 'an extension of scientific horizons in the study of animal behaviour and cognition to include conscious experiences […] animals are best appreciated as actors rather than passive objects'.[48] Similarly to Haraway, Griffin propositions a rebalancing of agency that implicates human and non-human animal encounters both inside and outside of scientific settings, with the intention to 'make sense of the thicket of scientific puzzles that have entangled the subject of animal consciousness'.[49] Based on the supposition that '[i]f animals experience simple conscious thoughts and feelings, it seems likely that they are sometimes communicated to others'[50], Griffin continues on and expands definitions of communication:

> We derive most of the information we use to infer what other people think and feel from their communicative behaviour. This includes not only spoken and written language but also the whole range of nonverbal communications, "body language", intonation of voice, autonomic responses such as flushing of the skin, dilation of the pupils, and all the signs of mental states such as fear and affection. […] These

[47] Donald Griffin, *Animal Minds* (Chicago: The University of Chicago Press, 1992).

[48] Donald Griffin, 'From cognition to consciousness', *Animal Cognition*, 1 (1998), 3-16 (p. 3).

[49] *Ibid.*, p. 5.

[50] Donald Griffin, 'Windows on Animal Minds', *Consciousness and Cognition*, 4 (1995), 194-204 (p. 194).

> considerations suggest that the basic approach that works reasonably well for reading the minds of one species can be adapted and extended to others.[51]

The potentialities of these different kinds of communication modes unlocks a series of stylistic opportunities for contemporary authors, through narrative and other literary strategies, to re-examine non-human animal modes of communication that help to dissolve otherwise divisional human and non-human animal distinctions maintained by verbal forms. Griffin also highlights ontological promise in other cognitive facilities, as '[a]nimals are sometimes aware of objects and events, including social relationships, memories, and simple short-term anticipation of likely happenings in the near future, and they make choices of actions they believe are likely to get what they want or avoid what they dislike or fear'.[52] Contemporary literary portrayals of these more expansive and encompassing cognitive abilities of non-human animals, together with non-verbal modes of communication, will be demonstrated throughout the thesis as aspects of non-human animal life harnessed by authors to explore the non-human animal experience within empirical systems of knowledge production.

Turning to scientific literary representations of these same modes of non-human animal consciousness and communication specifically, Eileen Crist's *Images of Animals* explores how linguistic choices in the scientific vernacular have traditionally portrayed the non-human animal mind as reactionary and insentient. Crist's cynicism about scientific vernacular is apparent, arguing that '[t]he terms employed derive their meanings from the observer's framework', and, actually, 'a diffuse background of subjectivity allows for the implicit or explicit emergence of animal mind'.[53] Crist proposes that anthropomorphism plays both a meaningful and important translational role in human understandings of non-human animals, operating 'at a deeper layer than a mere transposition of human attributes to animals'.[54] *Images of Animals* concludes that different *kinds* of knowledges concerning non-human animal cognition surface when using more

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[51] *Ibid*., p. 195.

[52] Donald Griffin, 'New evidence of animal consciousness', *Animal Cognition*, 7 (2004), 5-18 (p. 6).

[53] Eileen Crist, *Images of Animals: Anthropomorphism and Animal Mind* (Philadelphia: Temple University Press, 2000), p. 5.

[54] *Ibid.*, p. 29.

anthropomorphic modes of recording their behaviours, such as the instances of anecdotal evidence Crist provides throughout the book.[55]

Throughout her work, Crist criticises more mechanomorphic imitations of non-human animals featured throughout the behaviourist approaches of psychologists such as J. B. Watson and B. F. Skinner, as well as the founder of modern cognitive ethology Konrad Lorenz. Crist examines textual instances where the 'technical language of description dominates the account, while the animals and their interactions recede from visibility', refuting that more anthropomorphically indulgent description 'affects the imagination of the reader very differently, tending to be more richly textured and nuanced for the purposes of accommodating specific episodes observed, in all their local idiosyncrasies and modulations of expressions and circumstance'.[56] She continues to highlight a particular set of issues in the scientific representation of non-human animals by scientific empirical processes:

> A picture of animals as unaware and passive is created through the fragmentation of temporal continuity. On the other hand, when the unfolding unity of temporally contiguous actions is preserved, the resulting sequential coherence of actions reflects back on the actor. Animals are then understood as assembling and experiencing objects and events in the world in their temporal and spatial continuities.[57]

These problems of non-human animal representation outlined by Crist, especially regarding the limitations of scientific vernacular and the issues of temporality, evidence a particular set of opportunities and challenges for contemporary authors. Examples of various fictional literary strategies are highlighted and examined in each of the chapters as ways to navigate the epistemological logics of empirical science to represent and reconsider the non-human animal existent there.

As Crist demonstrates, inherent issues of temporality need to be navigated during empirical practices and scientific representations of the non-human animals under observation. Within

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[55] *Ibid.*, p. 41.

[56] Eileen Crist, 'The Ethological Constitution of Animals as Natural Objects: The Technical Writings of Konrad Lorenz and Nikolaas Tinbergen', *Biology and Philosophy*, 13 (1998), 61-102 (pp. 65-66).

[57] *Ibid.*, p. 75.

empirical science, temporality is linear but also socially organized by the human researchers, experiments conducted, observations made, and results recorded in a way that distort both the linearity of time and the experience of the non-human animal within it. Logically, issues of temporality introduce a critical question addressed throughout the thesis; how contemporary literature and its narrative strategies, the ability to fictionally negotiate temporal restrictions, represent and reconsider the temporal logics active within empirical science as well as the non-human animal experience both inside and outside epistemological systems of knowledge production. A specific challenge for contemporary authors is how to negotiate systems of temporality that increase or decrease the length of human and non-human animal encounters during investigations. For example, longitudinal cognitive behavioural studies initiate systematic periods of interaction between researcher and non-human animal subject over years, whereas short-term comparative psychology experimentations rely on designated test periods over far shorter periods of time often with little to no interspecies interaction or exchanges. The four sub-divisions of scientific investigations selected in the thesis demonstrate how logics of temporality work differently from one scientific branch to another, hugely influential on the experiential existence of the non-human animal implicated within each empirical methodology, and how contemporary literature examples reconstruct the experimental situation in such a way that reconsiders the potential for affective encounters and interactions during and outside of empirical modes of temporal control.

Literary strategies such as these form the main areas of inquiry throughout each chapter and the thesis more broadly. Whilst each chapter explores literary strategies employed to navigate the epistemological logics of the specific scientific setting featured in it, there are some overlapping points as some logics feature in all four scientific settings but operate entirely differently. The chapters comprise of literary strategies unique to their scientific setting, for example Chapter One explores the practice of interpretive flexibility in field-based observations and literary representation of those processes. Chapter Two focuses on strategies that negotiate the laboratory as a physically and conceptualised space in the empirical sciences, particularly those used in long-term non-human animal cognition and biomedical investigations. Chapter Three examines those literary strategies that tackle the separation and articulation of bodies during short-term comparative psychological experimentations, as well as logics of value and issues of autonomy also operational there. Lastly, Chapter Four looks at how literary fiction commentates on scientific ratifications of pain and the appropriation of death, in addition to

representations of the inanimate non-human animal utilised in invasive surgical procedures in order to reconsider their potential to still force affective human and non-human encounters. Importantly however, each chapter offers a consideration of strategies used to accommodate issues of temporality, as each of the four scientific settings implicate different temporal logics needed in order to offer an effective reconsideration of each different system of knowledge production without distorting the experiential perspectives of the non-human animal featuring within their empirical practices. A brief and broad overview of temporality in literature is therefore beneficial to establish a basic knowledge of its role in literary fiction to better extrapolate its use in the selected contemporary texts of the thesis.

Time is a fundamental and inseparable feature of narrative as it synonymous with stories and the practice of storytelling. The use and nature of temporality in literary fiction changed drastically throughout the twentieth century, with writers continuing to push the boundaries of narrative time and constructions of temporality in contemporary fiction today. Brian Richardson attributes the original revolutionary developments to a select group of modern writers, noting '[d]uring the first third of the twentieth century, several prominent novelists employed original temporal arrangements that broke radically with the Victorian convention of a largely chronological narrative'.[58] He identifies one form of temporal construction in particular that 'attained considerable critical prominence' during this period: 'the presentation of the story in several non-chronological sections that could then be assembled into a consistent linear trajectory'.[59] Jesse Matz highlights a sense of growing frustration preceding this literary movement regarding the long-established Victorian temporal traditions pertaining to narrative story that seemed far too restrictive and artificial for emergent modern writers. Matz succinctly outlines the exasperation experienced by these writers such as Conrad, Faulkner and Woolfe:

> For even if events happen in linear time, we tend not to experience that that way. At any moment, memories intervene, taking us back into the past even as we proceed into the future; or hopes project us forward, colouring the present with expectations

[58] Brian Richardson, 'Making Time: Narrative Temporality in Twentieth-Century Literature and Theory', *Literature Compass*, 3 (2006), 603-612 (p. 603).

[59] *Ibid.*

> of change; and other people's time frames often collide with our own to produce all kinds of temporal confusion.[60]

Similar reconsiderations regarding time and its effects on the experience of human existence presented a fascinating problem for modern writers and prompted numerous textual explorations into the potentialities of the narrative story structured by new forms of temporality. As Matz concludes, '[i]n recognition of these ways in which time is actually experienced, modern novelists often tried to break the sequence, to put things out of order, to work from the present back into the past, to dissolve linear time in the flux of memory and desire'.[61]

The perception and representation of time in literary narrative has become a more increasingly important aspect of literary fiction, having been initially studied through narrative theory and narratology, sub-disciplinary fields that sought clarification regarding the mechanics of temporal structure within fictional literary narratives. The theoretical paradigms of *fabula* and *sjužet*, or the events of a story and the representation of those events by way of an imaginative story narrative, epitomize the two dominant theoretical distinctions that predominated the field for well over a century prior to recent re-examinations. According to the definition of these two conceptual approaches, the events of the *fabula* take place by way of cause and effect, in linear time and in chronological order. In the *sjužet*, those same events are reordered, elaborated, and employed to form the narrative story. However, today examples of more evolved and complicated fictional representations of time and human and non-human experiences of time have ensured that temporality in literature is now an extensively challenged topic throughout a diverse range of subfields. The ensuing investigations contribute toward a growing body of work that offers vital insight into the history and ideology of modern and contemporary life, including post-human examinations of temporal principles operational in the empirical sciences and scientific productions of knowledge.

Richardson highlights that 'the study of narrative temporality is currently undergoing a most productive reassessment', due to the failure of more traditional theoretical paradigms 'to do justice to the unexpectedly innovative play with time in contemporary fiction'.[62] These

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[60] Jesse Matz, *The Modern Novel: A Short Introduction* (Hoboken: John Wiley & Sons, 2004), pp. 61-62.

[61] *Ibid.*, p. 62.

[62] Richardson, 'Making Time', p. 609.

reassessments include considerations by literary writers concerning the most effective way to realistically represent the temporal logics operational within the narrative settings featured in their novels, presenting a particular set of problems regarding the novels featured in this thesis: textual reimaginings of the scientific environment dictated by the laws of empirical investigation. Indeed, perceptions of time have been powerfully influenced by innovations throughout the natural and physical sciences, harnessed to become an externally imposed, socially, and scientifically regulated logic of contemporary life. Literary critic Joseph Hillis Miller outlines the two fundamentally different perceptions and uses of time utilized throughout the broad range of both scientific and literary practices:

> Though scientists and philosophers disagree about time, their goal is by scientific or logical methods to reach universal and universally accepted definitions of it. By contrast, representations of human time in literary works are singular, sui generis, different from all the others. They do not build on one another in a progressive clarification, as scientific theories of time at least aspire to do […] Each literary work has a different time sense – even those by the same author.[63]

As the thesis will demonstrate, the progressive clarification of time featured in the practices of empirical science are subjected to the temporal manipulations and constructions of literature, and *vice versa*.

Ultimately, the thesis intends to conduct its investigation differently from other recent literary critical animal studies investigations, evidenced by Crist's analyses of literary stylistic strategies of representing the non-human animal mind. Whilst still valuable, the work signifies a conventional trend in recent critical studies of both scientific literature and contemporary literary fiction to represent non-human animal consciousness, often under the rubric of anthropomorphism.[64] In literature, discussions revolve mainly around an author's stylistic strategies, narrative, and use of language to characterise the non-human animal mind. This thesis

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[63] Joseph Hillis Miller, 'Time in Literature', *Daedalus*, 132 (2003), 86-97 (p. 87).

[64] Examples include: *Thinking with Animals: New Perspectives on Anthropomorphism*, ed. by L. Daston and G. Mitman (New York: Columbia University Press, 2005); *Anthropomorphism, Anecdotes, and Animals*, ed. by R. W. Mitchell and others (Albany: State University of New York Press, 1997); Catherine Parry, *Other Animals in Twenty-First Century Fiction* (Palgrave Macmillan, 2017).

employs a different analytical approach that starts with the scientific experimentation being carried out and so does not excessively engage with representations of the non-human animal mind. The main reason being that large parts of contemporary empirical science are not interested in them at all. Instead, investigations remain focused on the four specific scientific settings, to consider how the ways non-human animal minds are represented in literary fiction is very much connected to the kind of empirical scientific investigation being conducted. This demonstrates how fictional literary representations of non-human animals utilised in empirical science follow the implications of the scientific setting, not simply because non-human animals have mental experiences. This approach is not intended to overlook the importance of literary representations of non-human animal minds, but to offer alternative strategies by which contemporary literature can contribute to reconsiderations of the non-human animal within the scientific setting.

It is also crucial to outline the thesis' position in regard to issues of morality, affect and suffering concerning contemporary literary representations of non-human animals within the scientific empirical environment. The study looks to examine how contemporary literature can demonstrate the messiness, complexities and limitations of how science and its scientific settings situate non-human animals and operate to produce knowledge in different ways. It does so by identifying the affective potential in moments during human and non-human animal encounters within the empirical scientific environment as depicted in contemporary literary representations. Whilst this focus naturally implicates moral reflection in taking non-human animals in scientific situations seriously, it does not make any assertions that in doing so readers of contemporary literature have to think morally about them. Indeed, the point of origin for the thesis was not to investigate what literature thinks about science, but rather to genuinely think about science and systems of knowledge production by way of contemporary literature. It intends to take the non-human animal as an object of knowledge production and make sense of it in relation to how the empirical sciences think of themselves. In respect to representations of suffering specifically, the investigation includes demonstrations and outlines of legislative protocols used to protect experimental and invasive procedures and processes employed by the sciences to provide contextualisation of the non-human animals caught within various, specific scientific situations. However, the thesis deliberately sidesteps talking about the broader moral implications of such treatments directly to avoid discussions regarding non-human animal suffering in too vague or broad terms that would only offer insufficient and ineffective consideration. Instead,

examinations always remain focused on the particulars of empirical scientific situations and the experiential existences of non-human animals that the specific scientific practice engenders. To reiterate, this thesis is concerned with evidencing the complexities and differences of how non-human animals are arranged in the social production of knowledge, that contemporary literature can effectively highlight these settings where knowledge is being produced, and that they are valuable in terms of considering the non-human animal situation and experience there.

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The thesis is divided into four chapters, organised into four key contemporary scientific modes of producing knowledge on non-human animal life and the distinct empirical methodologies they employ. The investigative aims of these chapters can be then divided into two sub-sections, with Chapter One and Chapter Two focusing on the broader epistemological logics that operate within field-based researches and the laboratory setting, respectively. This will provide the thesis with a foundational understanding that then permits Chapters Three and Four to concentrate on specialized scientific sub-divisions of laboratory investigations: experimental comparative psychology and invasive surgical practices of vivisection and dissection, respectively. The organisational purpose of these four chapters in this way is to demarcate and distinguish between the methodological and conceptual nuances existent within sub-fields of scientific enquiry, often mistakenly considered synonymous under the umbrella term “animal sciences”. Consequentially, these same differences influence the broader experience of the non-human animal located within each empirical situation and any comprehensive analyses into the abilities of literary fiction to effectively contribute to reconsiderations of these same implications benefit from such an investigative configuration.

Chapter One focuses on field-based researches on non-human animals in nature, offering an introduction to scientific empirical methodologies through this particular mode of knowledge production. The chapter analyses William Boyd’s *Brazzaville Beach* (1990) and its fictional reconstruction of the field environment, explicitly the human and non-human animal encounters implicated by the epistemological logics that operate there. Boyd’s novel suits the investigative intentions of the thesis as it is a fictional reimagining of the research conducted by cognitive ethologist Jane Goodall, and draws heavily on a compendium of other female primatologists operating in field-based practices in the 1970s and 1980s. Then, using Donna Haraway’s conceptualisation of the empirical sciences as socially constructed, the chapter examines how the

novel offers a reconsideration of field-based empirical practices and its systems of knowledge production using non-human animals. The chapter is particularly interested in fictional representations of the formations of scientific paradigms and the ownership of and tensions between old and new knowledges produced on non-human animal life. Using Haraway's theoretical framework, the chapter claims contemporary fictional representations of field-based practices can reconsider the non-human animal in relation to the scientific cultural climate they operate within and the different kinds of knowledges that these cultural influences produce. It also highlights the ability of literary strategy to promote the existence of other ways of knowing, a valuable consequence of the complexities of observing non-human animals in nature. Notably, the chapter includes a comparison of field and laboratory settings, as both are featured in the novel; the latter used to emphasize epistemological logics of the former.

Chapter Two develops preliminary understandings of empirical practices of the laboratory to explore scientific idealisations of it as a physical and conceptualised space, reading the fictional reimaginings of the modern laboratory featured in Colin McAdam's *A Beautiful Truth* (2013) and Karen Joy Fowler's *We Are All Completely Beside Ourselves* (2014). Both novels involve fictional representations of the laboratory setting, drawing on the cognitive behavioural studies and biomedical experimentations conducted on primates during the second half of the twentieth century. Additionally, both texts examine the ways in which the laboratory operates as a hermetically sealed off and autonomous space, existent on the periphery of the social world. Implementing the constructive theoretical approaches of science sociologist Bruno Latour, the chapter outlines the ways in which fictional strategies represent the laboratory setting to view the non-human animal experience within them, similarly to investigations of Chapter One, as wholly dictated by the broader scientific culture. The chapter concentrates on broader, more general epistemological logics operating in the laboratory space, particularly those that influence the non-human animal experience. These include systems of autonomy, issues of temporality, and installations of visibility and invisibility, among others, providing a beneficial outline of epistemological logics active within the laboratory situation that facilitate ensuing examinations of specific sub-field empirical practices and the conceptual oppositions they implicate in the following chapters.

Chapter Three draws on three fictional texts that explore conceptual oppositions apparent within experimental cognition studies: Lydia Millet's 'Love in Infant Monkeys' (2009), Karen Joy

Fowler's 'Us' (2013), and Ursula Le Guin's 'Mazes' (1975). Millet's story fictionally reconstructs the experiments into isolation and depression in infant macaques conducted by comparative psychologist Harry Harlow throughout the 1950s and 1960s. Fowler and Le Guin both offer alternative literary strategies by which to depict the multiplicity and multitude of non-human animals used in short-term psychological experimentations, a logistical challenge for authors attempting to depict an empirical space reliant on multisubject investigations. Though a science-fiction author, Le Guin remains valuable as her dystopian vision of a non-human entity subjected to experimental practices is clearly a reinterpretation of human and non-human animal encounters within the laboratory space. Additionally, her strategies install a sense of cultural distance and alienation within its dystopian vision of the experimental setting, stylistic approaches heavily resonant with other instances of contemporary fictional representation. Whilst science fiction sometimes facilities fantastical applications of empirical science, it also maintains a cautionary scepticism regarding our absolute reliance on it as a form of knowledge production and technological advancement, valuable when considering the objectives of this thesis. Other key epistemological characteristics featured in this third chapter include issues of autonomy, installed systems of separation, and more refined temporal logics. These are accompanied by the conceptual approaches of Vinciane Despret, including investigations into the influence of the experimental situation, the potential value of anecdotal evidence, and how non-human animals respond to questions *other* than those that investigators believe themselves to be asking. Using Despret's approaches, the chapter maintains that contemporary literary strategies can rebalance the non-human animal presence within empirical methodologies to suggest other forms of encounter existent there and opportunities for valuable interspecies interaction.

Chapter Four reads Sylvia Torti's *Cages* (2017) and Allegra Goodman's *Intuition* (2010) as fictional examples of invasive surgical practices, modes of knowledge production that depend on the non-human animal body as biomaterial. Whilst both novels feature non-human animals used as disposable biological resources in contemporary scientific practices, they are predominantly inanimate. These texts are chosen because they feature narratives that revolve around invasive surgical use of non-human animals, though the actual non-human animals used during these processes is not the main emphasis of either novel. Nevertheless encounters still occur, though inanimations of non-human animals greatly influence the nature of and opportunities for valuable human and non-human animal encounters. Therefore, Jane Bennett's equalising vital materiality

theory is employed to re-balance these interspecies encounters in order to inform an effective evaluation of the epistemological logics at play and those fictionally represented. These logics include appropriations of death and ratifications of pain, articulations of human and non-human animal bodies, and scientific reasonings of value.

Taken together, these four chapters constitute an extensive cross-section of the different sub-divisions of empirical sciences that use the non-human animal to produce scientific knowledges, each with different epistemological logics that influence the experiential existence of the non-human animal within them. The literary materials will be read against these scientific modes to provide a reconsideration of the different ways in which non-human animals are observed, recorded, exploited, represented and then misrepresented. All these converge to support the fundamental purpose of the thesis investigation, that is an analytical overview of the representations of non-human animals within empirical scientific settings in contemporary literature.

Chapter One

'Short on scholarly apparatus, but very readable': Scientific Fictions of the Field in *Brazzaville Beach*

> I was starting a study that would take ten years; I was young, and that seemed a lifetime. Now I realize that the first ten years were just a beginning. Certainly our picture of chimpanzee behaviour would be very different if the work had ended in 1970. We had no notion then that chimpanzees might, deliberately and systematically, kill one another.
>
> – Jane Goodall, *Life and Death at Gombe*[65]

In 1979, *National Geographic* published an article by cognitive ethologist Jane Goodall regarding observations of chimpanzee violence, cannibalism, and included what is now one of the most famous and graphic accounts of primate infanticide witnessed at the Gombe Stream Research Centre in Tanzania. Goodall's article elaborated on a series of violent exchanges observed between two separate chimpanzee social groups from 1974 to 1978, later dubbed 'the four-year war' by Goodall and her research team.[66] Goodall notably refused to jump to premature conclusions regarding deliberate cruelty on the part of the chimpanzees, whilst resultant observations made throughout the wider primatological community confirmed the same gruesome behavioural traits.[67] Though hypotheses regarding the motivations for such behaviour

[65] Jane Goodall, 'Life and death at Gombe', *National Geographic*, May 1979, p. 616.

[66] Jane Goodall, *Through a Window: 30 Years with the Chimpanzees of Gombe* (London: Weidenfeld & Nicolson Ltd, 1990), p. 87.

[67] Amanda Rees, *The Infanticide Controversy: Primatology and the Art of Field Science* (Chicago: University of Chicago Press, 2009), pp. 13-14.

were fiercely disputed in the period that followed, the revelations nonetheless changed the model of knowledge pertaining to chimpanzee behaviour forever.

Goodall's study at the Gombe National Park represents a mode of scientific investigation uniquely available to those within the animal life sciences, including primatology and other sub-divisions of cognitive ethology: field-based research. Scientific field-based practices look to observe and document non-human animal life within its natural setting to produce models of knowledge pertaining to the true behaviours of the non-human animal species that is being monitored. As Goodall's excerpt points out, field-based studies confront a particular set of challenges as a mode of producing knowledge on non-human animal life, including issues of temporality and the interpretive flexibility of the researcher. In field research, issues of temporality refer to the length of time observations of non-human animals in nature can take, spanning months or more often years of investigation, as the investigator must wait for the non-human animal to display an original behavioural trait that does not fit into pre-existing behavioural models of knowledge. Therefore, scientific knowledges are very slow to form because of the necessarily longitudinal nature of field-based research. It presents a challenge for fictional authors, in terms of how to portray the longitudinal and linear temporal logics of field research accurately, capturing the experience of the non-human animals within it, and prompting constructive reconsideration through temporal strategies available to the novel form. Interpretive flexibility relates to both the ambiguousness of non-human animal behaviour and experiential influences of the individual researcher themselves, whose own personal partialities may affect the translation of behaviours under observation. This does not necessarily debunk the information collected but renders the knowledges obtained something *different* from scientific idealisations of what constitutes as original discoverable truth. Taken together, these two epistemological logics represent distinct features of field-based researches and its systems of knowledge production. In comparison to the laboratory setting, being constructed and customised specifically to shut out the natural world, field-based researchers conduct what Robert Kohler determines to be 'practices of place'.[68] Certainly, if laboratories are to be considered the ultimate controlled environment, eliminating all unwanted variables and operating wholly apart from the natural setting, then field-based research looks to capture the complexities and variabilities of nature in its entirety. Using Goodall's researches at Gombe as a

[68] Robert E. Kohler, 'Place and Practice in Field Biology', *History of Science*, 40 (2002), 189-210 (p. 192).

case study, the empirical processes used to produce knowledges on non-human animal life in natural settings will form the scientific empirical situation investigated in this chapter.

This chapter draws upon secondary theoretical approaches in order to critique the epistemological logics specific to field-based research with the aim to better analyse conceptual oppositions both within them and fictional explorations of the same. Donna Haraway's sociological studies on the empirical sciences, focused particularly on primatology, represent some of the most influential theoretical approaches of recent years. *Primate Visions*, first published in 1990, offers an interpretational historiography of modern primatology, including an extensive analysis of the scientists and the subsequent narratives that look to represent non-human animal life. The work contends that science and scientific narratives are entirely socially constructed, forever inclined to satisfy dominant social mythos concerning identity, race, and gender inherent in western culture. *Primate Visions* directly contests the scientific ideal of objectivism, proposing narratives to be determined by subjective interpretations, individual motivation, and personal agenda. Crucially, in terms of the purposes of the chapter, Haraway's overview includes examinations of epistemological features particular to field-based researches conducted on non-human animals within her examinations of the narrative history of primatology. This facilitates analytical explorations of the featured fictional materials and its contribution to broader discussions on empirical scientific uses of non-human animals, further outlined in the following section.

William Boyd's *Brazzaville Beach* is an indirect fictional re-imagining of the inter-group violence observed by Goodall amongst chimpanzees groups at the Gombe National Park during the late-1970s, and forms the fictional material of the chapter. Blatant resonances between Boyd's novel and Goodall's own researches allow helpful parallels to be drawn between them, permitting contextualisation and insights into empirical practices of field research, its methodologies, and conceptual oppositions extant within them. The novel's central thematic priorities are empirical systems of knowledge production, the formation of scientific paradigms, and arising issues of ownership and tensions between old and new knowledges. Boyd is interested in three particular methodological features used within field-based studies: issues of temporality, the interpretive flexibility of the individual researcher, and the translational capacities of human language to encapsulate the vast complexities of non-human animal behaviour. Indeed, these

thematics are established early in the novel, demonstrated by its human researcher protagonist, Hope, during her introductory observations of a male chimpanzee, Clovis:

> I never really warmed to Clovis, he was far too stupid to inspire real affection, but he always claimed a corner of my heart, largely – I suppose – because of the way he instinctively and unconsciously cupped his genitals whenever he was alarmed or nervous. It was rather endearing, I thought, and it showed a natural vulnerability, in strong contrast to his usual moods: raffish arrogance or total and single-minded self-absorption […] Knowing Clovis as I did, I suspected he could maintain his inertia for ages. I looked at my watch […] I had been watching him for three hours, during which time he had done almost nothing singular or unusual – but then that too was worth recording, of course.[69]

Boyd describes Hope out in the field, indulging her tendencies toward anthropomorphism in her personal reflections on Clovis, but maintaining scientific practices of both observation and documentation. Boyd draws attention to the fact that Hope has both scientific and other forms of *knowing* the non-human animal in this setting, a research approach explored frequently by sociologists interested in field-based sciences.[70] It is the conceptual oppositions both within and between these different modes of knowing that drive events featured in the novel, implemented through Boyd's broader literary strategy.

In terms of how *Brazzaville Beach* affects how we understand the scientific methodology that shapes the chapter, Boyd suggests that the scientific field researches on chimpanzee life contained in the novel are shaped by Hope's wider life experiences. He suggests more broadly that scientific investigation is not always idealistically objective but rather driven and influenced by the needs and emotional lives of the individuals that conduct it. The implication that the epistemological logics and methodological practices contained within the novel are already influenced by Hope's own nature prompts a reconsideration of their effectiveness and objectivism in capturing non-human animal life. Firstly, Boyd draws attention to the specific epistemological logics and contestations in scientific fieldwork by placing them within the various dramatic

[69] William Boyd, *Brazzaville Beach* (London: Penguin Group, 1990), pp. 9-10.

[70] Amanda Rees, 'Anthropomorphism, Anthropocentrism, and Anecdote: Primatologists on Primatology', *Science, Technology, and Human Values*, 26 (2001), 227-247.

settings featured throughout the narrative. These same logics then influence dramatic events in the novel, highlighting inherent conceptual oppositions within them in to prompt broader reconsiderations of the *ways* in which knowledge on non-human animal life is produced. Considerations of empirical processes include observation, interpretation, and documentation, and how different *kinds* of knowledges are then transferred into the public domain as the definitive determination of that specific non-human animal behaviour. Therefore, the chapter concentrates on an examination of narrative strategies used by Boyd to highlight the conceptual oppositions apparent within these operational logics of field-based investigations, by having these same oppositions heavily influence and drive events throughout the novel. Instances of textual analyses are positioned within a broader study of how Boyd's *Brazzaville Beach* intervenes in order to initiate a reconsideration of scientific empirical practices in field-based research to produce knowledge on non-human animals. Therefore, the following overview of the novel's narrative structure, settings, characters, and events facilitate an explanation of how these epistemological features are presented.

Published in 1990, Boyd's novel consists of three distinct yet interlacing narratives relating to the personal and professional experiences of Hope Clearwater; each narrative takes place during a different point within a broader chronology of Hope's life, and each with distinctly different narrative settings. Chronologically, the first narrative takes place in England during the developmental stages of Hope's scientific career as she meets and marries John Clearwater, an eccentric but brilliant mathematician destined never to achieve the professional immortality he desires. The pressure of John's unsuccess places tremendous strain on their relationship as he eventually sinks into a severe depression and develops hysterical behaviours, culminating in his suicide, and causes Hope to seek emotional refuge in central Africa observing chimpanzee social behaviour, the second narrative sequence. The third and temporally last narrative is based in the present and is where we first meet Hope, occupying a beach house situated on Brazzaville Beach in the Republic of Congo. Hope is absorbed by and contemplative of the two traumatic experiences that feature in the two prior narrative sequences, that now form her past. Whilst the sequence relating to Hope's work as an ethologist studying primate behaviours in the African wild is to begin with of seemingly greater importance, especially considering the purposes of this chapter, the accompanying two other narratives complement Boyd's broader fictional investigation into the workings of scientific empiricism. Indeed, each of the three distinct narratives coalesce to form the broader narrative of Hope's life, a form of temporal logic that

situates her experience with the chimpanzee group inside a more extensive chronology of events and experiences, that include her scientific investigations, featured *within* the novel. By establishing the temporal logic of the novel in this way, Boyd is able to contrast, compare, and examine the distinct temporal logics of the scientific investigations featured, whilst simultaneously offering a form of detached commentary on them. This is in turn facilitated by Boyd's choice of scientific setting, characters, and sequence of dramatic events during the second narrative where Hope works as a cognitive ethologist.

Boyd's fictional scientific institution in *Brazzaville Beach* is the Grosso Arvore Research Centre in the forests of the Republic of Congo. The research project at Grosso Arvore is led by Eugene Mallabar, a world-renowned cognitive ethologist whose research, collected over a twenty-five-year period, has determined the current model of chimpanzee behaviour. Mallabar's publications, such as the aptly named *The Peaceful Primate* and *Primate's Progress*, specifically emphasize the docility and social aptitude of the Grosso Arvore chimpanzee group, demonstrating the seemingly peaceable complexities of individual and inter-group relations. When Hope arrives, Mallabar is on the verge of publishing his *chef-d'oeuvre*, his final and definitive say on wild chimpanzee behaviour based on his assumptions of chimpanzee civility. Mallabar, along with his body of work, represents the dominant paradigm or old knowledge on chimpanzee behaviour that Hope will work to displace. Indeed, later in the narrative Hope observes unprecedented interterritorial acts of violence and cannibalism carried out by a northern-based group of chimpanzees on her allocated southern group. Hope's discoveries represent the new knowledges that refute and thus threaten the epistemological foundation of Mallabar's understanding of chimpanzee behaviour, the current dominant scientific paradigm that he then looks to fiercely guard. The narrative's denouement sees Hope professionally shunned, denied ownership of her discovery and eventually exiled from the project altogether. At the last, she yields to her internal emotive conflict and deliberately, irreversibly breaches the boundaries between researcher and subject in order to intervene and lethally end the violent conflict between the two chimpanzee groups.

Through the embodiment of new and old knowledges in Hope and Mallabar respectively, Boyd can dramatize the tensions between them to highlight epistemological incongruities in empirical science more broadly. The subsequent notions of territorial conflict and tribalism that surface throughout the novel, alluded to by intra-conflicts between both human and non-human

animal characters, indicate Boyd to be making a sociobiological point about how scientific empiricism operates, evolves, and progresses. The crucial implication is that *Brazzaville Beach* offers a fictional narrative strategy about the *affective* qualities and potential within scientific field-based researches portrayed within the novel, not simply a sociological overview of its empirical processes. Therefore, returning to the main investigative objective of the chapter, it is firstly important to understand the empirical *mode* or *medium* in which knowledge is recorded in field studies. This is doubly imperative as it is the primary form of knowledge production featured throughout Boyd's *Brazzaville Beach*. The following section utilities the theoretical approaches of Haraway and Mary Sanders Pollock, and some historical context by Goodall, to evidence the characteristics of this unique mode of documentation of non-human animals in the field: the field narrative.

Scientific Fictions: Construction of the Field Narrative

Throughout *Brazzaville Beach*, Boyd offers a commentary on field narratives employed as the designated mode used to record and translate observations of non-human animal life situated in nature. Hope frequently considers the limitations of her own scientific method, that it 'cannot cope with abrupt change, that other common feature of our lives and the world. Not everything moves by degree, not everything ascends and descends like lines on a graph'.[71] She outlines the scientific idealisation of scientific empiricism aspiring to 'reproduce the magical, infinite variety of the natural world. Extreme complexity would emerge from the simplest formula', and that 'the most profound joy for any scientist was when the abstract workings of the mind found a correspondence in nature, in the world we live in […] the most acute of all the intellectual pleasures available to man'.[72] The field narratives that appear in the novel, represented by the notes and field journal that Hope herself maintains, only materialise at the end of a sequence of other translational processes. The first steps in this process are Hope's own interpretations of her personal observations made in the field. For example, as Hope finishes one scientific article, she remarks 'I worked hard that night. By the time I went to bed I had most of my article drafted out. I was pleased with my title too'.[73] The articles represent a culmination of scientific processes,

[71] Boyd, p. 227.

[72] *Ibid.*, p. 254.

[73] *Ibid.*, p. 133.

including observation, recordation, translation, and publication, all linguistical modes reliant on deliberate choices being made by the field researcher in the selection of language used, with field narratives covering the initial observation and recording stages. Each stage therefore threatens further dilution from the discoverable truth that the investigator set out to uncover, evidenced by Hope's later mention: 'I typed the final draft of my article. It was twenty pages long, short on scholarly apparatus, but very readable'.[74] Knowledges on non-human animal life are captured within these particular modes of empirical scientific documentation, but the field narrative itself becomes a complicated culmination of observation, interpretation, translation, and representation.

Haraway's *Primate Visons* offers an extensive analysis of the scientific field narrative, using primatology as a case study. She examines the interchangeable utilisation of *fact* and *fiction* in scientific narratives involving non-human animals more broadly, evidencing instances throughout primatology 'where possible worlds are constantly reinvented in the contest for very real, present worlds'.[75] Elaborating on her opinion that science is a social construction, she notes '[b]oth science and popular culture are intricately woven of fact and fiction. It seems natural, even morally obligatory, to oppose fact and fiction; but their similarities run deep in western culture and language'.[76] Haraway reiterates initial aesthetic differences between the two, that 'a fact seems done, unchangeable, fit only to be recorded; fiction seems always inventive, open to other possibilities, other fashionings of life'.[77] However, she offers a potential benefit in implementing both concepts:

> Facts can be imagined as original, irreducible nodes from which a reliable understanding of the world can be constructed. Facts ought to be discovered, not made or constructed […] In that original sense, facts are what has actually happened […] Fiction can be imagined as a derivative, fabricated version of the world and experience, as a kind of perverse double for the facts or as an escape through fantasy into a better world than "that which actually happened". But tones of meaning in

[74] *Ibid.*, p. 168.

[75] Haraway, *Primate Visions*, p. 5.

[76] *Ibid*., p. 4.

[77] *Ibid*.

> fiction make us hear its origin in vision, inspiration, insight, genius […] That is, fiction can be *true*, known to be true by an appeal to nature.[78]

Haraway proposes a middle ground somewhere between the existent event or phenomena of fact and the imaginative creativities of fiction, a situation where the two mediums can coalesce productively. Evidencing Goodall's primatological narratives, Haraway purports the result is 'a synthetic scientific reconstruction of primate reality […] these histories are stories about stories, narratives with a good ending […] stories with a particular aesthetic, realism, and a particular politics, commitment to progress'.[79] Haraway suggests a re-complication of non-human animal behaviours that come into being during the construction of the field narrative. She proposes the opportunity for greater understanding through mutual points of reference that are anticipated during the creation of these narratives by the field researchers themselves, more than traditional idealisms of scientific empiricism would otherwise allow. Crucially, these narratives and the potentialities within them take time to form, and are susceptible to alteration pertaining to imperceptible influences.

Mary Sanders Pollock provides a comprehensive overview of the characteristics specific to primatological field narratives in *Storytelling Apes*, a critical exploration into 'the storyworld that comes into being when a primatologist writes a field narrative – a literary zone somewhere between scientific argument and prose fiction'.[80] Pollock offers that the inability of technical scientific vernacular to capture the complexities of natural life facilitated a fusion of translational modes, catalysed by Goodall's entry into primatology.[81] Rees stresses how field researchers consciously *construct* narratives '[that] sorted chaotic and fragmentary observations into a coherent, logical narrative'.[82] This is echoed by Haraway, who determines that this mode of scientific investigation depends on 'devices for transcribing the immense complexity and chaos of competing interpretations into unambiguous traces, writings, which mark the emergence of fact,

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[78] *Ibid*., pp. 3-4.

[79] *Ibid*., p. 4.

[80] Mary Sanders Pollock, *Storytelling Apes: Primatology Narratives Past and Future* (Pennsylvania State University Press, 2015), p. 8.

[81] *Ibid.*, p. 13.

[82] Rees, *The Infanticide Controversy*, p. 82.

the case about reality'.[83] Whilst initial impressions of narrative *construction* could potentially threaten to dilute genuine moments of behavioural insight in the literal and empirical sense, it permits researchers a degree of relative freedom to anticipate a variety of valuable non-human animal behaviours in such a way as to charge them with greater potential for meaning, a conceptual approach that will prove significant in interpreting further textual instances identified in Boyd's *Brazzaville Beach*.

Unsurprisingly, narrative constructions necessitate a narrative setting, one that is 'narratively satisfying and at the same time scientifically plausible'.[84] In an empirical sense, field narratives must be convincing in their accuracy and ability to portray the environmental situation in which observations of non-human animal life are made, though without allowing the narrative form to moralize non-human animal realities.[85] Therefore, the impossible complexities of the natural world compel the field researcher to settle on something in closer alignment with prose fiction, as Pollock aptly summarises:

> The "field" is a real place, but it is also, paradoxically, an expression of the human imagination. It is an area selected within the natural range of nonhuman species […] bounded artificially from the outside; individuals and collective entities within it are named and classified from an outside perspective. The field exists in linear human time, not earth time; it is mapped from a human perspective; and it is remade from the inside, the space invariably altered by technological presence, the camera flash of the human eye. The field is a special construction – a chronotope, or time-space.[86]

Pollock demonstrates inherent contestations present within field narratives, including the misapplication of temporal logics and scientific determinations to the field setting and the non-human animals within it. Pollock suggests that this mistranslation is not necessarily wrong, but *different* from what idealisations of scientific investigation would seek to expose, born from its insistence to qualify and quantify the natural world in accordance with predetermined empirical

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[83] Haraway, *Primate* Visions, p. 6.

[84] Pollock, p. 155.

[85] Amanda Rees, 'The Undead Darwin: Iconic Narrative, Scientific Controversy and the History of Science', *History of Science*, 47 (2009), 445-457.

[86] *Ibid.*, p. 89.

systems and epistemological constructs reliant on linear temporality. As non-human animal behaviours are observed and recorded, Pollock suggests a perceptual *filling-in* by the field researcher, a form of anticipation that completes what is regarded as missing information to produce something that satisfies the dualistic scientific and narrative requirements of field narratives, comparable to Haraway's merging of *fact* and *fiction*. Consequently, observed non-human animal behaviours are supplemented by these descriptive anticipatory inclusions during translation, the result being a scientific field narrative that consists not just of pure empirical information, but includes a variety of emotive and affective resonances included during interpretations made by the field researcher themselves.

Historically, Goodall's own fieldwork traditions at Gombe during the mid-twentieth century necessitated the development this new scientific vernacular, requiring a linguistic form able to encapsulate the complexities of non-human animal behaviours and the environment in which they were being observed. The impossible richness of non-human animal life presented Goodall with the problem of creating a mode of recording that could still be considered scientifically accurate and productively viable; as Haraway denotes, '[s]cientific practice is literary practice […] negotiation, strategic moves, inscription and translation'.[87] Due to her unconventional training, Goodall continuously struggled to adhere to regimented scientific practice herself, as she 'freely made use of all those forbidden terms and concepts', which often led her to commit the 'cardinal sin' of anthropomorphism.[88] She recalls having 'no idea that it would have been more appropriate to assign each of the chimpanzees a number rather than a name', and so her early publications were met with 'a chill silence' from the scientific community.[89] This was further complicated by the fundamental nature of field research itself; its investigative aims are far more expansive and incorporative than the methodological specificity of laboratory-based experiments. Nevertheless, the unconventional scientific approaches of those in the field, like Goodall at Gombe, accommodated the construction of this new form of scientific vernacular, resulting in the field narrative.

[87] Haraway, *Primate Visions*, p. 6.

[88] Goodall, *Through a Window*, p. 12-13.

[89] *Ibid*., p. 12.

Haraway and Pollock demonstrate the interdisciplinary complexity of the field narrative, an epistemological feature of field-based research that sets it apart from other empirical modes of producing knowledge on non-human animal life. Constructions of the field narrative are inescapability linked to longitudinal temporal logics of field researches, periods of long-term exposure to the non-human animals under observation and their environmental circumstance, allowing greater opportunities for affective influence on the individual researcher away from the regimented processes and specificities of laboratory-based investigations. Subliminal resonances of these affective potentials are demonstrated in Pollock's determinations of a *storyworld* that is created within field narratives, an amalgamation of observed non-human animal behaviour and human modes of understanding what they are observing. Having established the particular characteristics of the field narrative, the chapter now analyses textual instances within *Brazzaville Beach* that establish and elaborate on its role as medium of recording and producing knowledge on non-human animal life; starting with Boyd's fictional strategy to compare the epistemological logics of the field and the laboratory settings.

More Meaningful: Advantages of Field Practice

It is worth noting that, whilst laboratory-based research forms the scientific focus of the three subsequent chapters of the thesis, it will feature intermittently throughout here due to its interconnected historical development alongside field practices.[90] Kohler highlights their history of affiliation:

> Laboratory and the field are different cultural terrains, to be sure, but they are contiguous, and there is a steady traffic across the border; and field scientists regularly mix and match lab and field methods […] They are interdependent, even coevolved – parts of a common culture.[91]

Rees highlights the sense of dissonance between advocates of the laboratory and field-based practices, historically two sites where 'validating scientific knowledge moved aspects of

[90] This mutual developmental history is outlined up until the 1950s in Robert Kohler's *Landscapes and Labscapes: Exploring the Lab-Field Border in Biology* (Chicago: The University of Chicago Press, 2002).

[91] Kohler, 'Place and Practice in Field Biology', p. 189.

knowledge from the lab to the field and back again'.[92] The blurring of demarcations between knowledges extracted from these two different environments has led to a generalisation regarding species behaviours and a rash application of behavioural characteristics. Resultantly, behaviours unique to either wild chimpanzees or those raised in captivity for experimentation were often misapplied as universal traits true of all chimpanzees everywhere. Rees summarises this historical incompatibility, noting that 'though some researchers did cross from laboratory to field and back again, the chasm between the two yawned. The most important reason for this gulf was the imbalance in the authoritative status granted to knowledge thought to emerge from these different locations'.[93] Each empirical environment, and the models of knowledge created within them relating to non-human animal behaviour, were originally unable to recognise the distinct advantages of the other that postponed the communication of mutual, correlative characteristics beneficial to progressing the overall understanding of the species. The tensions between these two settings, as well as the exchanges of knowledge between them, are something that Boyd looks to explore throughout the novel.

Brazzaville Beach offers a dramatization of scientific idealisations of the laboratory, revisiting the tensions between epistemological logics operational within the laboratory and field settings, in order to highlight the abilities of those specific to field-based researches. This is implemented by Boyd's inclusion of Anton Hauser's laboratory in the Grosso Arvore Research Centre. Hauser's laboratory is an effort to control nature *within* nature, an island of experimental control situated in amongst a wholly uncontrollable location as an epistemologically autonomous territory. Boyd describes how:

> The simple building, a rectangular, corrugated iron shack, contained a small but surprisingly efficient and well-equipped laboratory […] Hauser's lab had a small generator to power his centrifuges and chill his refrigerators. In a corner a table fan turned its face this way and that, dispensing its breeze.[94]

The laboratory's subtropical setting remains palpable through Hauser's use of the fan, a seemingly nondescript detail that faintly dilutes the authority of the space to expel environmental

[92] Rees, *The Infanticide Controversy*, p. 8.

[93] *Ibid*., p. 34.

[94] Boyd, p. 35.

influences entirely, and a reminder of the laboratory's situation. Boyd's depiction of Hauser is one of somewhat comic professionalism, wearing his 'white coat and trousers, but with no shirt or vest under the coat […] Beneath the antiseptic smells of his chemicals and preserving spirits it was just possible to distinguish the thin vinegar reek of his body odour'.[95] Hauser is Boyd's satirical caricature of the stereotypical laboratory scientist. His white coat, symbolic of the exalted purity of experimental scientific empiricism, is parodied in contradiction with his underlying shoddy appearance and poor hygiene. Connotations of contamination are again underlined by Hope's olfactory experience of Hauser's musk, perceptible in amongst those emitted by scientific substances. Importantly, Hauser's slackened appearance is the result of the environment outside the laboratory walls, again emphasising its intrusion on the procedures of scientific work. Nevertheless, the demarcated authority of Hauser's laboratory space remains, as Hope 'knocked and was admitted'.[96]

Boyd highlights the exclusive epistemological abilities of the laboratory in terms of the *types* of knowledge produced there, conversely accentuating the limitations of Hope's own systems of knowledge production, those specific to the field-based researcher. When Hope discovers the remains of what she suspects to be an infant chimpanzee, she looks to confirm her preliminary suspicions of intergroup cannibalism by testing the composition of the chimpanzee faecal matter which she collects. Boyd has Hope describe: 'I examined the ground beneath the fig tree and collected samples of faeces in my specimen bottles. As I labelled them I tried to keep my thoughts calm and rational'.[97] The potential knowledges contained within the materiality of the specimens are beyond Hope's empirical ability to extract and utilise, such are the exclusive capabilities of those trained to operate the laboratory and its technologies. Hope therefore needs Hauser and the empirical modes of knowledge production available to him, in this case biological, in order to access these domains of information and recover evidence. Hauser's exclusivity in obtaining and using these knowledges is underlined, as '[he] knew better than anyone what chimpanzees ate. He had identified dozens of plant and fruit types from faecal study alone'.[98] There is an obvious sardonic undertone implied here by Boyd, as Hauser's exclusivities involve analysing samples of non-human animal excrement as opposed to the authentic living beings

[95] *Ibid.*

[96] *Ibid*., p. 40.

[97] *Ibid*., p. 34.

[98] *Ibid*., p. 36.

themselves. Nevertheless, Hauser thus dominates the intellectual domain pertaining to chimpanzee biology, granted access by his learned laboratory practices explicit to extracting data from biological material.

Through the interactions between Hope and Hauser, Boyd implicates two models of knowledge production that produce different *kinds* of knowledge of the same non-human animal life and depending on translational approaches specific to their empirical environment. Indeed, materiality is another characteristic of the laboratory that Boyd looks to explore. In his description of Hauser's laboratory, Boyd highlights a level of interdependence existent between the scientist, empirical apparatus, and nature, represented by the biological material. All contribute to the production of biological knowledge and, although dependent on one another, permit a level of control on the part of the scientist. For instance, following Mallabar's interjection to disrupt Hope's theory, she recalls '[Hauser] handed me my specimen bottles, rinsed clean' and reveals the materials were incinerated.[99] Regardless of his motives, the materiality of biological science allows Hauser to halt this particular avenue of investigation by simply disposing of the specimen samples. By removing the samples, Hauser's mode of knowledge production cannot work, as biological material provides *the* critical contributor to the empirical process. This ensures Hope cannot utilise this knowledge and attribute it to her behavioural hypotheses of chimpanzee cannibalism, thus closing off an avenue of potential new knowledges. Therefore, the modes of knowledge production in the laboratory seem manufactured and mass-produced, especially as its investigative directions are decided by the scientist and chosen hypothesis being tested.

Goodall recognised the special potential in studying chimpanzees in their natural habitat and even understood that a 'natural, undisturbed, representative field site' perhaps could not exist in the face of global human expansion:

> It is easier to study intellectual prowess in the lab where, through carefully devised tests and judicious use of rewards, the chimpanzees can be encouraged to exert themselves, to stretch their minds to the limit. It is more meaningful to study the subject in the wild, but much harder. It is more meaningful because we can better understand the environmental pressures that led to the evolution of intellectual skills in chimpanzee societies. It is harder because, in the wild, almost all behaviours are

[99] *Ibid*., p. 40.

> confounded by countless variables; years of observing, recording and analysing that take the place of contrived testing; sample size can often be counted on the fingers of one hand; the only experiments are nature's own, and only time – eventually – may replicate them.[100]

Goodall is well aware of the obstacles of field research, and yet determinedly considers these to nevertheless render results more significant than those garnered in a laboratory. Instead, Goodall considers non-human animal actions in the wild to be more *meaningful*, any behavioural trait being a legitimate expression of a single or multiple behaviour of genuine consequence. Goodall's application of the term *meaningful* is as ambiguous as it is equally richly suggestive, with the passage ending in acknowledgement of the impossibly multifaceted nature of wild non-human animal behaviour. Undoubtedly, Goodall believes that animal behaviour observed in the wild has *more* significance to forming a better understanding of *truer* non-human animal behaviour than those occurring within the laboratory. Perhaps most importantly, Goodall sees field studies as the fairest form of observational study with no expectations or preconceptions placed on the subject on the part of the human observer.

Goodall highlights the implications of expectational performance that occur in laboratory-based investigative designs and methodologies; that non-human animals are encouraged to behave in certain ways, determined by scientific hypotheses being tested. This particular conceptual consideration resonates particularly with the theoretical works of Vinciane Despret, whose approaches consider anthropocentric tendencies in empirical science. Her considerations of how particular *kinds* of scientific questions encourage particular *kinds* of responses of non-human animals will feature as the primary theoretical approach in later chapters concerning fictional representations of the laboratory. Still, Despret contends that field practices should 'find new methods to focus […] on those behaviours that are *most meaningful* to the animals themselves'[101], rather than 'make an inventory of what makes the animals act and react […] [and] infer what the animals perceive and what the perceived things mean for them'.[102] Like Haraway, Despret's considerations reinforce Goodall's belief in the advantages of good field practice

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[100] Goodall, *Through a Window*, p. 19.

[101] Vinciane Despret, 'Responding Bodies and Partial Affinities in Human-Animal Worlds', *Theory, Culture & Society*, 30 (2013), 51-76 (p. 54).

[102] *Ibid.*, p.55.

undelimited by systems of strict scientific empiricism, stating that 'understanding another being's perspective requires the researcher to take into account the fact that some things are *more* meaningful than others; it requires the observer to give them some worth, some affective values'.[103]

Goodall's sarcastic vocabulary divulges a thinly veiled criticism of laboratory modes of empirical enquiry: that scientists conducting research in the laboratory environment are actually enhancing or even altering the chimpanzees in some way, attempting to 'stretch their minds' and lure them outside of what is considered the remits of normal behaviour. The teaching of chimpanzees to perform repetitive tasks is, to Goodall, a contamination of true cognitive behavioural study, whereas in the field or wild 'a single observation may prove of utmost significance'.[104] For Goodall, laboratory-designed experiments are detrimental to the processes of extracting pure knowledge through observation, as the concept of encouragement proposes that laboratory-based data is already compromised and therefore constructs biased results. Goodall concedes to a 'solid core of data concerning chimpanzee intellect collected so carefully in the lab setting'[105], but draws attention to the artificial modes of laboratory-based research, including 'contrived testing', 'specific categories', 'given criterion' and, particular to chimpanzees, being 'language-trained'.[106] In her overview of behavioural observations in the wild, Goodall additionally introduces a key conceptual opposition between laboratory and field-based studies: issues of temporality. The temporal nature of field-based research is unique, as 'the only experiments are nature's own, and only time – eventually – may replicate them'.[107] The chapter will now examine Boyd's literary strategy in *Brazzaville Beach* to depict the temporal logics of field researches, and whether fictions include the same impressions of meaningfulness in their representations of producing knowledge on non-human animal life in field-based researches.

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[103] *Ibid.*

[104] Goodall, *Through a Window*, p. 19.

[105] *Ibid.*

[106] *Ibid.*, p. 18.

[107] *Ibid*.

Temporal Logics in the Field

The following section will highlight how Boyd fictionally reconstructs and examines the conceptual oppositions within empirical temporal logics operational within field-based researches by placing them within the broader temporal logic of the narrative, Hope's life chronology and the dramatic events that occur. In doing so, Boyd has events in the novel play out in accordance with the competing temporal logics of the scientific investigations conducted at Grosso Arvore, Hope's investigative researches on the chimpanzees and the tensions that arise between her and Mallabar. Particularly, the longitudinal studies of field-based research present a challenge and opportunity for fictional representations looking to consider researches on non-human animals in the wild. These longitudinal modes of temporality inherent to field-research push literary strategies to consider how best to negotiate what Goodall describes: 'a sense of timelessness'.[108] *Brazzaville Beach* presents various contending temporal logics in such a way so as to promote a reconsideration of their role as empirical constructs utilized in the production of particular *kinds* of knowledge pertaining to non-human animal life, and constitutes Boyd's main literary strategy by which to intervene in on broader discussions concerning scientific methods of understanding.

Generally, productions of scientific knowledge always operate in sequential order; observations are made, data is recorded, evidence is published, eventually establishing the active scientific paradigm pertaining to behavioural patterns, true in *all* forms of empirical scientific research. Paradigms can be challenged later through the scientific principles of refutation and conjecture, resulting in an active paradigm being replaced by another, fundamentally contradictory but equally substantiated by evidential proof. Craig Stanford highlights a particular characteristic of primatological research, as 'models tend to be predictive for a time, but as new, contradictory data accumulate they become obsolete'.[109] The fundamental principles of these displacement processes are indeed true of scientific empiricism as a whole, as it ensures endless progression and advancement under its own momentum and epistemological design. However, during field-based research the temporal logics of these processes are substantially lengthier than those of laboratory investigations. Once a paradigm has eventually been refuted and fresh data

[108] *Ibid.*, p. 201.

[109] Craig Stanford, 'The Social Behaviour of Chimpanzees and Bonobos: Empirical Evidence and Shifting Assumptions', *Current Anthropology*, 39 (1998), 399-420 (p. 406).

collated to approve new hypotheses, the implications of the paradigm shifts mean the old data cannot be revisited. Again, the displacement of old knowledge is true within all empirical modes of investigation, whatever its operational temporal logic.

The most blatant mode of temporal strategy concerning field sciences in *Brazzaville Beach* is its condensing of empirical chronologies: the time it takes to observe and document non-human animals in the wild. The research traditions of Grosso Arvore are framed at the beginning of the novel, as Boyd condenses twenty-five years of methodological study in order to instate the dominant paradigm against which to then challenge Hope's discovery of chimpanzee violence later on. Boyd employs one significant paragraph for this, as he describes:

> The essence of the Mallabar approach to the study of chimpanzee society was painstaking and time-consuming. Its first and key requirement was that the observer habituate himself with the apes he was studying so that they accepted his presence in their world without fear or inhibition. Once that had been achieved (it had taken Mallabar almost two years) then the next stage was to observe and record. Over the years of the project this process had evolved into something highly organized and systematic and vast amounts of data were gathered and analysed. All observations were logged in a uniform way; chimps were identified, followed, and their biographies were steadily compiled and annotated over the years. The result was that, over two decades on from Mallabar's initial studies, the Grosso Arvore project now represented the most exhaustive and thorough study of *any* animal society in the history of scientific investigation.[110]

Hope's arrival here is contextualised within the broader history of Grosso Arvore with its long-standing empirical traditions following Mallabar's publications focused on chimpanzee docility, the behavioural expectations of the research blatantly apparent here. Data accumulated within this period makes up Mallabar's dominant paradigm that Hope's discovery will eventually threaten to displace. Conversely, the temporal logics of Grosso Arvore, in terms of both its history and scientific methodologies, are placed within the larger chronology of Hope's life and experiences, allowing Boyd to fictionally reconstruct and reconsider how temporal systems of knowledge production operate in comparison.

[110] Boyd, pp. 27-28.

The passage evidences Boyd's novelistic structure that places two competing paradigms alongside one another on the same page, presenting the reader with the chance to compare, contrast, and consider the ways in which scientific inquiry operates sequentially to produce closed circuits of knowledge. This implicates that scientific knowledges are in a constant state of creation, displacement, and progression, limiting both validity and applicability. Boyd makes a conscious narrative choice to stretch and manipulate time in the novel in order to present conflicting paradigms, whether sequentially or simultaneously, creating narrative tensions and driving the dramatic events in the novel. Meanwhile, the chimpanzees of Grosso Arvore have also been historicised, moving from anecdotal observation, to collated data, and eventually passing into behavioural truth. The indication here is that processes of appropriation occur as new observed behaviours are resultantly deemed *unusual* against active empirical models of knowledge on non-human animal life, rather than having been simply unobserved up to the point in question. This causes Mallabar's paradigm of chimpanzee docility in the novel to seem outdated and essentially flawed, fitting chimpanzee behaviour into predetermined models of knowledge rather than constructing another. As such, Mallabar consciously works against scientific idealisms of empirical objectivity.

Hope's existence at Grosso Avore is the direct result of one such new behavioural irregularity, a fissure in the societal structure of the chimpanzee group, representative of the new emergent knowledges that Boyd sets up against Mallabar's dominant paradigm. The occurrence of such a variation in the chimpanzee's behaviour and societal structure already signifies change and approaching tensions in the novel. However, being recent history, hypotheses remain ever speculative and Mallabar's paradigm of chimpanzee docility is constantly being reassured and reinforced by established practices and systems of knowledge production at Grosso Arvore. This is certainly evident as Hope summarises her post:

> [T]here had been a mystifying schism in the chimpanzee tribe that Mallabar had documented so thoroughly […] a small group of chimpanzees had broken away from the main unit […] and had established themselves in an area of the forest not hitherto covered by the research project […] Why had they left? Was this important? […] A new job was funded to try and answer these questions. It fell to me to observe this small breakaway group – the southerners as they were known.

Boyd situates Hope's southern group away from the main body of chimpanzees, figuratively separate from Mallabar's models of behaviour collated over the last twenty-five years. The implications of Boyd's narrative strategy here introduce a new temporal logic, as Hope becomes exclusively reliant on information revealing itself over time, as no prior evidence or behavioural models can be applied to the chimpanzees' division. It is here that Boyd sets up the primary temporal logic of the novel, within the broader temporal chronology of Hope's life experience.

Interestingly, Hope's investigative objective is born from an enquiry into the importance of the chimpanzee social division in relation to Mallabar's dominant theory, rather than its own potential for unique behavioural observation. In terms of Boyd's narrative strategy, the break is representative of a temporal separation from the historical chronology of the Grosso Arvore chimpanzees at the point of Hope's arrival; with the creation of the "southerners" signifying the beginning of an entirely new non-human animal group history and subsequent field tradition prompted by their new environment. Indeed, Boyd's placement of the chimpanzees into an unexplored area of the Grosso Arvore reserve emphasizes this sense of temporal alteration, away from established research traditions and allowing the ensuing narrative to consider what it is to construct an entirely new model of knowledge regarding non-human animal behaviour. Boyd explores this new temporal logic by fictionally moving into the more immediate logics of temporality operational within Hope's own scientific methodological practice.

Quotidian Experience and Other Ways of Knowing

The quotidian experience of the field-based researcher makes up the hours, the days, the months and the years that allow for the slow formation of knowledge concerning non-human animal behaviour. Data collected is collated over time, patterns are identified, trends emerge, and are eventually recognised as behavioural truth. The longevity of field research is compulsory due to the nature of observing non-human animal subjects in the wild and researchers have no control over the environmental context in which observations are being made. This not only includes the immediate physical environment, but also political and economic circumstances as well as the psychological situation of the individual researcher that influence conduct, often imperceptibly. Additionally, researchers install human social constructions of time onto the natural world during observational periods. All these factors contribute to the construction of

field narratives created during that particular period of time observing non-human animals, affecting all relative subsequent data. The implication is, as Pollock highlights in Goodall's work, that 'the "field", as it is constructed by primatologists, is located not only in space but also in time'.[111]

Knowledge production cannot be produced on demand and researchers must be patient enough to wait for genuine moments of insight into animal cognitive behaviour. This is another issue of temporality that emphasizes the difficulty field-based research faces in terms of impactful evidence, simply because any empirical evidence takes such a long time to formulate. It also implicates that some periods of time are *more* significant than others and that vast amounts of *less* significant time become obsolete; never recorded as it is not prioritised by the hypotheses under investigation. When inverted, this concept opens up further potentialities regarding valuable encounters between researcher and non-human animal subjects: that *other* types of affectivity exist in these disregarded periods of time that are never recorded. These can include moments of accidental or deliberate interaction or acknowledgement between researcher and non-human animal subject, immediate environmental influences, personal interpretations of the non-human animals behaviour or situational circumstance in addition to or other than the empirical observations recorded. Essentially, any form of human and non-human encounter or interaction that is secondary to and consequent of the scientific observation at hand.

The affective potentialities of such moments are the driving force behind many of Hope's actions throughout *Brazzaville Beach*, existent within the temporal logics of the empirical science portrayed but excluded by its working observational methodology, the emotive culmination of which leads Hope to her eventual deadly intervention in the chimpanzee inter-group conflict. Certainly, these potentially affective moments are made clear from the very beginning and permeate the second narrative orientating around Hope's time at Grosso Arvore, with Hope opening:

> I never really warmed to Clovis, he was far too stupid to inspire real affection, but he always claimed a corner of my heart, largely – I suppose – because of the way he

[111] Pollock, p. 72.

> instinctively and unconsciously cupped his genitals whenever he was alarmed or nervous. It was rather endearing, I thought, and it showed a natural vulnerability.[112]

This reminder of Hope's recollection of Clovis, an older male chimpanzee, is to evidence the construction of a *secondary* model of knowledge pertaining to the non-human animals under observation, separate but in parallel to the scientific empirical knowledges being produced concurrently. This model of knowledge constitutes Hope's intuitive interpretations of Clovis's actions in accordance with her own methods of understanding, converging at points of relatability and thus *meaningful* to Hope. The difference here is that this a secondary, personalised model of knowledge is created by these *other* affective moments and encounters remains with the individual researchers. Whilst the scientific empirical model of knowledge produced alongside it is then processed, published, and circulated within scientific communities and outside them as they pass into the public domain. Boyd highlights the deliberate selectivity of empirical processes and their temporal logics applied to the non-human animal in the field in this way to conversely prompt a reconsideration of the *entire* period of observation. This includes moments that fall outside of the methodology implemented to include other secondary, but still valuable, human and non-human animal moments of interaction and encounter. When the longitudinal temporal logics of field-based research are considered and harnessed in terms of these potentials, fictional reconstructions are able to utilise and explore resultant possibilities.

In *Brazzaville Beach*, Boyd summarises and then accentuates the methodological logics of temporality in field-based research by first contrasting them with those operational within the laboratory space, a comparison that also occurs early on in the novel. Indeed, Hauser is able to reproduce experiments at his leisure within the temporal logics of the laboratory and fully utilise his whole time to explore particular hypotheses and determine results. Boyd accentuates these capabilities at poignant points in the novel, particularly when Hope first realises her initial biological discoveries may be under scrutiny; she notes:

> I walked back to my tent, noticing that the lights in Hauser's lab were still on. I realized I hadn't seen him in the canteen that evening and I felt a seep of worry drip through me. Hauser was not known for working late.[113]

[112] Boyd, p. 9.

[113] Boyd, p. 38.

So proficient are laboratory systems of knowledge production at navigating issues of temporality, Hauser can choose to continue his work beyond the temporal limitations applicable to everyone else, being always restricted to daylight hours. Apparatus used to facilitate temporal control, such as the laboratory's light fitting, ensure Hauser enjoys potentially infinite periods of productivity, and are so effective that Hauser even cautions Hope: '[d]on't waste my time, Dr Clearwater'.[114] This is doubly potent when considered in contrast to Hope's own 'painstaking and time-consuming' research, that is then established as the dominant empirical mode Boyd seeks to examine throughout the novel.[115]

Whilst field-based studies may operate in terms of anything from hours to decades, laboratory studies can hone their methodologies to produce data by the hour, creating artificial research environments to neutralise the effects of any external variables. These variables include the constraints of time or the investigatory context that time inevitably complicates. For example, a laboratory can devise a test to evaluate a particular aspect of primate behaviour and allocate a certain amount of time to investigations; issues of temporality are dictated entirely by the investigator. This is mostly due to the fact that laboratory tests are replicable and repeatable, to be used over and over again at the convenience of researchers. In essence, laboratory work can "freeze" time or at least temporarily close out its influence. Scientists can then focus in on one mode of investigation for however long they need or want to, whether it be a few days or more, and the tests will provide closed-circuit data. This data can be generated into results, published and submitted to the scientific community quickly for consideration with each experiment being identically replicable by others who would look to refute findings or confirm results. This permits laboratory research a considerable amount of self-generated momentum, avoiding the periods of relatively unprofitable sedation experienced by those operating in field-based research.

Brazzaville Beach effectively uses these same modes of temporal control within its depiction of the quotidian experience of the field-researcher, as the narrative *must* progress over long periods of time. Boyd uses plotting as a method by which to allow literary forms to explore what it is to perform researches on non-human animals by way of scientific empirical systems, either speeding up or slowing down time to present amalgamated moments for consideration. This is doubly beneficial as creative decisions to manipulate forms of temporality can add up to

[114] *Ibid.*, p. 26.

[115] *Ibid.*, p. 27.

different narrative effects, reworking time to create devices such as direct or indirect antagonism, narrative tension, or extended periods of suspense. In effect, as a novelist, Boyd has techniques and narrative abilities at his disposal that can manipulate, stretch and ultimately navigate the temporal restrictions of empirical science in order to highlight and present those features particular to non-human animals in the wild that enable more direct re-examination.

A prominent example of Boyd's awareness of the temporal restraints of field-based research arrives in the form Hope's initial discovery of inter-group violence between the chimpanzee groups. Hope finds a half-eaten chimpanzee body in the aftermath of an instance of infanticide and cannibalism, though this is not known by Hope or her field assistant Alda at this point in the narrative:

> Chimps would eat baby monkeys, duiker, bush pigs, anything they could catch… But I knew this wasn't a baby baboon. This was the corpse of an infant chimpanzee, a few days old […] I wondered what Eugene Mallabar would make of this. Alda waited patiently for me. After a minute or two I told him to put the corpse in a plastic bag and seal it. As he did so, I examined the ground beneath the fig tree and collected samples of faeces in my specimen bottles. As I labelled them I tried to keep my thoughts calm and rational. What I had here was some very interesting evidence, but the case it made was highly circumstantial […] I checked my natural excitement: softly, softly, I thought.[116]

Hope's visceral excitement is initially kept in check by her inclination toward scientific rationale; any projections of the potential significance of her observation mediated by the need to find 'more facts, more data'.[117] As Hope's observation does not fit into current models of knowledge and understanding of chimpanzee behaviours, the potential impact of her observation is disclosed. Any future publication or article is subject to the restrictions of temporality born out the environmental context she works in, taking time to reach publishers so that Hope can only sit and wonder 'how Mallabar would react when it came out'.[118] However, at this point it remains only ever a distant and remote possibility.

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[116] *Ibid.*, pp. 33-34.

[117] *Ibid.*, p. 35.

[118] *Ibid.*, p. 199.

Boyd is offering a commentary on the processes of empirical science that insist on adherence to particular temporal processes pertaining to the inescapability of linear progression, as well as significant implications of patriarchal authority and the particular contestations it resultantly implicates. Not only do significant observations have to reveal themselves, but Hope must avoid 'unprofitable speculation' and remain receptive to the number of potential futures that the temporal logic of field-science opens up; one instance does not guarantee repetition.[119] Hope understands her claims will be dismissed without significant evidence to refute Mallabar's current empirical paradigm and would therefore fail to displace it. The principle narrative thread in *Brazzaville Beach* orientates around Hope attempting to collect her supporting data over an extended period of time, being wholly reliant on behaviours revealed intermittently by the chimpanzees. In the meantime, her time is otherwise occupied by 'writing up my field notes' and making 'no alterations to the data'.[120] Crucially, Hope must always adhere to the principles of temporality that dictate the pace of scientific empirical knowledge production in her discipline, opening up an extensive period of time around which Boyd can build the narrative sequence of events supplemented by secondary moments of affective encounter between the human and non-human animal.

This is not to suggest that these other types of affective moments outside of the empirical observation of the investigation are frequently occurring. The immediate quotidian experience of the field-researcher poses a challenge to literary narrative strategies looking to accurately portray the slow, sometimes monotonous, corporeal existence of the field researcher. Literary authors are faced with a dilemma concerning what to and what not to include, without losing a longitudinal sense of time and the richness and vibrancy it implicates when working in the field. Pollock highlights such instances in Goodall's own experience, as '[s]ometimes she sat for hours […] waiting for the chimpanzee to move […] isolation, disease, danger, discomfort, and boring food are occasionally interrupted by rich discoveries – rare glimpses across the species barrier'.[121] Certainly, Boyd's narrative technique generates a true sense of the frustrations inherent to the progressive nature of fieldwork by accentuating moments of *unproduction*, as Hope often 'watched without result'.[122] These inclusions conversely help to create a sense of longevity,

[119] *Ibid.*

[120] *Ibid.*, p. 40.

[121] Pollock, p. 72.

[122] Boyd, p. 168.

anticipation and tension when pitted against the impactful potential of her data, being of 'inflammatory and controversial nature'.[123]

To escape the sequential realities of empirical science, Boyd can bend and stretch the temporal modes inherent with field-based research, allowing Hope's progress to continue throughout the course of the novel without losing the crucial impressions of endurance and longevity. More obviously, Boyd's choice of the name *Hope* implicates feelings of optimistic expectation and anticipation, a desire for particular things or events to occur, which also insinuates a degree of subconscious bias in *wanting* something to happen. To accommodate both the temporal logics and the sense of anticipation that drives events in *Brazzaville Beach*, events of the narrative are interceded with stylistic methods of temporal bypass:

> Alda and I planned to go to a large fig tree where the southern group often fed. We followed a winding path through the humid undergrowth […] The fig tree proved to be empty apart from a small troupe of colobus monkeys. But in the distance, not too far off, I could hear the sound of the excited hooting and screaming of chimpanzees. Another fig tree grew in an outcrop of rocks about half a mile away […] It took us half an hour to reach it […] Alda and I settled down for a long period of observation, our analysis sheets ready, our field journals open. The chimps glanced at us from time to time but otherwise ignored us – they were thoroughly habituated to observers.[124]

Boyd can speed up proceedings, skipping large periods of time in order to condense and compact revelations to then present to the reader, as well as emphasize environmental logistics of research in the wild. Rees highlights, '[s]ince researchers wanted to study animals living under natural conditions, they had to travel to the field'.[125]

Boyd's narrative frequently acknowledges periods of travel to accentuate a sense of physical distance between the researcher and the field, also strengthening a feeling of anthropological distance. Hope's default quotidian routine is established by these narrative

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[123] *Ibid*.

[124] *Ibid.*, pp. 30-31.

[125] Rees, *The Infanticide Controversy*, p. 26.

signposts, being 'away from the camp most days from dawn to sunset'[126] and devoting 'a fifth to a quarter of my day was spent in commuting to and fro'.[127] Boyd's narrative utilises flashbacks and prolepses that work against and dissolve the rules of strict linear progression inherent to empirical methodologies, without losing the sense of realism in the time taken to reach the field physically. Boyd has the capability to regulate, control, and navigate the same kinds of *more* and *less* significant periods of time in the narrative in order to ensure progression but also consider identified, important conceptual instances depicted in the construction of Hope's model of knowledge pertaining to chimpanzee violence.

Boyd's narrative strategies can be seen at work more visibly in the first instance of chimpanzee cannibalism and infanticide in the novel, as Hope begins the day setting off into the forest in search of Lena and Bobo, a female chimpanzee and her male infant:

> I picked up my provisions from the canteen and headed south to look for Lena and Bobo. I found them towards mid-morning, with all the other members of the southern group present, at the half-dead fig tree […] I took up my position and observed them for almost three hours.[128]

The linear progression of the narrative at this point is relatively fast, as Boyd bypasses the unproductive hours that precede the impending violent event. Not only this, but Boyd's strategy places this particular day at the most recent point within a broader chronology of past days and potentially weeks. This not only adds realism and reemphasizes the longevity of field-based studies on non-human animals but proposes any shift in temporal logic signals an imminent moment of behavioural significance. Indeed, at the moment of action, Boyd abruptly switches the narrative to real-time, a minute-by-minute depiction of the events that unfold before Hope's eyes:

> Then I heard a warning bark that snapped me out of my circling speculations. I looked up. Lena, holding Bobo to her, was now sitting in a low branch of the fig tree. Rita-Lu was approaching her, on the ground, one hand held out […] Lena bared her teeth at

[126] Boyd, p. 228.

[127] *Ibid.*, p. 47.

[128] *Ibid.*, p. 129.

> Rita-Lu. I wondered what I had missed, the mood was now so clearly tense and hostile.[129]

The temporal mode of the narrative decelerates to accommodate the viciousness of the assailing chimpanzees in uncomfortable detail, emulating the sequential immediacy of Hope's own experiences being eyewitness. Lena and her infant are attacked by two other females, mother and daughter Rita-Mae and Rita-Lu. Rita-Mae eventually captures and kills Bobo, with 'a distinct cracking sound as the frail skull was crushed by her teeth'.[130] Boyd's narrative then dwells on the deliberate gruesomeness of their cannibalistic behaviour in the aftermath of such ferocious action: 'Rita-Mae was eating Bobo. She tore into his belly and pulled out his entrails with her teeth. She flung his guts away on to the rocks'.[131] The eventual end of the chimpanzee's violence is signalled as the temporal logics at play become less immediate and more malleable, with Boyd looking to isolate and close off one moment of significant non-human animal behaviour and steer towards another. Boyd writes, 'Lena sat and watched Rita-Mae and Rita-Lu for the rest of the afternoon as they fed idly on the body. At dusk, when they moved off to their nesting site, Rita-Mae draped the shreds of Bobo's body over her shoulders like a scarf'.[132]

Once again, to draw effective comparisons between two temporal logics of empirical science, Boyd sets the temporal logics of Hope's research up against the artificiality of those installed by Mallabar, most specifically in the form of the Artificial Feeding Area at Grosso Avore:

> [T]he first sign of human habitation you came across, as you approached the camp […] was a wide cleared area, about the size of three tennis courts, in the middle of which was a low concrete structure – hip-high – with four small wooden doors set in one side. It looked like some sort of cage […] but in fact it was the research project's pride and joy: the Artificial Feeding Area.[133]

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[129] *Ibid*.

[130] *Ibid.*, p. 131.

[131] *Ibid*.

[132] *Ibid.*, pp. 131-132.

[133] *Ibid.*, p. 13.

In comparison to Hope's empirical methodology, and considered in the broader narrative temporal logic of Hope's life experience, Mallabar's artificial feeding area is a blatant rejection of the fundamental temporal logics pertaining to field-based observations of non-human animals: an endeavour to eliminate all of the external variables that characterise the complexity and uncontrollability of the field. To the reader, Mallabar's feeding installation exposes the complete artificiality of both the chimpanzees' behaviour and any subsequent data or publications derived from it. It is an utter jeopardization of non-human animal behavioural genuity for the sake of autonomous temporal control and logistical empirical convenience. Here, parallels can be drawn with Goodall's early years at Gombe, as she later 'regretted having set up the banana feeding station that seemed necessary for sustained observation […] to all appearances, the feeding stations changed the very behaviours she originally wanted to observe'.[134] Mallabar has succumbed to external pressures, or the need to sustain knowledge production in order to secure the future of Grosso Avore. By drawing a comparison between the temporal logics of Hope and Mallabar's investigations, Boyd can offer a fictional interpretation of the consequences should empirical temporal be misapplied or abused. When considered within the broader temporal logic of Hope's life, represented in the narrative of *Brazzaville Beach* as a whole, the reader can consider broader issues of temporality and whether empirical modes of temporal control truly capture the truth of non-human animal life.

Interpretive Flexibility of the Researcher

The following section investigates Boyd's fictional exploration and reconsideration of the specific empirical practices and procedures that work to produce knowledge on non-human animal life. Having considered the implications of the temporal logics presented throughout *Brazzaville Beach,* the chapter now looks to specific methodological practices that *form* these models of knowledge in the field: a borderland where human and non-human animal encounters take place within this epistemological mode. With the assistance of Haraway's conceptual approaches, examples in the novel are identified and analysed in terms how they offer a reconsideration of these same specific empirical practices and the broader epistemological logics of field research. Indeed, during *The Infanticide Controversy*, Rees raises a significant notion:

[134] Pollock, p. 73.

scientists 'working within the field environment demands far more interpretive flexibility than is called for in the laboratory'.[135] The broader implications of the term *interpretive flexibility* reintroduce the perception of models of scientific knowledge being wholly social constructions, reminiscent of conceptual approaches outlined in Haraway's *Primate Visions* previously. This forms the first empirical methodology addressed in this section of the chapter. Followed by analyses of the ways in which empirical science historicises non-human animal behaviours to suit anthropocentric models of understanding, as well as the contentions that arise between the old and new knowledges they produce.

Haraway contends that '[s]cientific practice is above all a story-telling practice in the sense of historically specific practices of interpretation and testimony', an amalgamation of factual extant phenomena and creative fictions of the researcher.[136] Social influences imperceptibly formulate at this early stage of knowledge production to guide the resultant narratives constructed by the researcher, as Haraway contends that science endeavours to maintain 'the old western dream of perfect representation'.[137] She asserts that whilst Goodall 'transcribed the lives of chimpanzees into the languages of sociobiology and behavioural ecology', in reality drawing from 'the myth of the faithful copy, where interpretation or reinvention disappear and history and its complexities can be finally suppressed.[138] Nevertheless, non-human animals are implicated within these resultant narratives, being all at once *true* and *not true*: translational reconstructions of what the original observations were supposed to capture according to the methodological idealism of empirical science. To ensure an effective analysis of Boyd's fictional reconstruction of this methodological practice, it is beneficial to briefly outline the nature of scientific empirical processes out in the field and examine how these could be influenced by the emotive lives of the researchers conducting them.

Interpretive flexibility seems to oppose the fundamental tenet of scientific empiricism that its researchers remain dispassionate investigators of pure knowledge; being trained observers and *interpreters* of nature seeking truth. Observational skills are ultimately *learned* skills intended to reinforce notions of a centralised methodological process by which to conduct all researches

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[135] Rees, *The Infanticide Controversy*, p. 31.

[136] Haraway, *Primate Visions*, p. 4.

[137] *Ibid.*, p. 185.

[138] *Ibid.*

in this epistemological context. Proponents of laboratory-based science would regard interpretive flexibility as wholly detrimental to the distinct empirical strategies of field-based researches. Initially, first impressions of interpretative flexibility as a scientific empirical approach would perhaps threaten contamination by the otiose concepts of anthropomorphism, or a misapplication of motivations to newly observed non-human animal behaviours. However, degrees of interpretive flexibility reintroduce the potentialities of Goodall's earlier assertion of observations in the wild being more *meaningful*, there being a multiplicity of explanations equally applicable regarding any given behaviour at any given time.

The construction of scientific facts in field-based research starts when observations are recorded, collated, and behavioural motivations deduced, one being repeated and reiterated over time and eventually becoming established as behavioural truth. Issues regarding interpretive flexibility arise during this primary stage: the visual observation of the field researcher. Haraway identifies this moment within Goodall's approach:

> Goodall's first mode of collecting data was to enter in a daily field diary whatever she observed and to transcribe the fieldnotes nightly by typewriter […] When the banana feeding system was initiated in 1962-63, notes were spoken onto tape and transcribed nightly. This highly personal style was progressively broken apart, quantified, and standardized.[139]

Interpretive flexibility occurs at the initial frontline of human and non-human animal encounters, the first stage within a broader model of knowledge production that influences all other stages that follow. The implication is that each observation is susceptible to subjectivity during this process, but positive outlooks of interpretive flexibility propose that this does not necessarily make them unusable. Uli Meyer and Ingo Schulz-Schaeffer propose that actually 'the natural world plays only a small or no role in the construction of scientific knowledge […] The facts upon which scientific statements are based do not possess an inherent meaning. They have to be interpreted to become meaningful'.[140] Meyer and Schulz-Schaeffer determine that interpretive flexibility primarily occurs when scientific observations and its resulting data cannot be explained

[139] *Ibid.*, p. 172.

[140] Uli Meyer and Ingo Shulz-Schaeffer, 'Three Forms of Interpretive Flexibility', *Science, Technology & Innovation Studies*, 1 (2006), 26-40 (p. 27).

with recourse to undisputable knowledge, suggesting adaptability and deliberate application.[141] With non-human animals, this idea is doubly interesting as observations and the subsequent data interpreted often do not fit perfectly into an uncontested scientific *truth*. Some perceive little danger of interpretive flexibility in research on non-human animals in the wild, as Colin Allen and Marc Bekoff propose: '[i]f interpretationalism is a threat at all, it is a threat to all of cognitive science; it is of no special concern to cognitive ethology'.[142]

These wider implications pertaining to interpretive flexibility mean that field-based non-human animals study and its data seems far more *ambiguous* than the more demonstrable observations made in the laboratory. Therefore, as an empirical method of knowledge production, interpretive flexibility presents a number of particular epistemological challenges. Firstly, there is the inability to establish a consensus as to what constitutes "typical" primate behaviour. Yet conversely, the detrimental effects of more precise behavioural absolutism would only promote limitation, as interpretatively flexible approaches potentially benefit and increase chances for open-mindedness and genuine revelation. Goodall seems all too aware of both dangers in her employment the term *meaningful*, as it advocates the use multiple explanations for each isolated and observed behaviour without the promotion or disregarding of one explanation over others. As Goodall elaborates: '[chimpanzees] are such complex beings, their behaviour so flexible, their individuality so pronounced'.[143] This is blatant a rejection of more definite empirical approaches: one correct and absolute behavioural explanation that can be totally isolated from all others to determine a definitive model.

Indeed, Meyer and Schulz-Schaeffer claim that productive interpretative flexibility can greatly influence ongoing 'future directions of scientific research'.[144] If misused, processes of interpretive flexibility could then be regarded as a way by which to *force* the production of scientific data, as field-based research and the subsequent discussions and discourses it creates within scientific communities, tend to stagnate owing to the obligatory longevity of observation. This leads to what is deemed 'infinite regress'; disputes are locked in a perpetual cycle of

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[141] *Ibid*.

[142] Colin Allen and Marc Bekoff, *Species of Mind: The Philosophy and Biology of Cognitive Ethology* (Cambridge: The MIT Press, 1997), p. 66.

[143] Goodall, *Through a Window*, p. 198.

[144] Meyer and Schulz-Schaeffer, p. 28.

discussion, interpretation and theorisation without progression or definitive conclusion.[145] This consideration recognises the relative autonomy of the non-human animal subjects, as ethologists must wait ever-patiently for behavioural results not always particular to one specific behaviour, but perhaps several simultaneously. Consequentially, data extracted through field research struggles to completely isolate one possible behavioural explanation from another, as it never quite eliminates all confounding variables. As an empirical process, the scarcity of data and substantial results may manifest as external pressure to drive the continuation and, by association, the direction of research; the procurement of which is not necessarily genuinely revelatory.

This concept is explored by Boyd in *Brazzaville Beach*, as Mallabar's dominant paradigm regarding chimpanzee docility turns out to be only ever artificially encouraged by abundances of food. By accentuating the inauthenticity of results from Mallabar's feeding station during the narrative, Boyd accentuates the legitimate practices of Hope's observation. Conversely, Boyd implicates Hope's observations of violence with a sense of genuine revelation and importance regarding behavioural truth, as Mallabar's construction represents the abuse of the positive contributory potentials of interpretive flexibility. Certainly, Hope's thinly veiled professional scepticism of Mallabar's tactics is clear:

> All the noise came from the Artificial Feeding Area, and from the volume of pant-hoots, barks and scream it sounded as if there were two dozen chimps scoffing Mallabar's free bananas […] everybody else would be there […] half a dozen assistants, all observing and notating furiously. Ian Vail would be out in the field, I supposed; like me he was highly dubious about Mallabar's celebrated toy.[146]

Mallabar's Artificial Feeding Area is not only symbolic of human encroachment on non-human animal habitats but exhibitions his abuse of the principles of interpretive flexibility. Observers and data gatherers at the artificial feeding area interpret the activities of the chimpanzees there as wholly natural and assume they are indifferent to the existence of the feeding device itself. Mallabar even instructs Hope at one stage to merely '[o]bserve and note. Leave the interpretation

[145] *Ibid.*, p. 28.

[146] Boyd, p. 37.

to me'.[147] Resultantly, readers view Mallabar's process as compromising the data collected, published, and asserted as empirical truth, also highlighting the inherent risks and limitations of interpretive flexibility as a process by which to translate non-human animal behaviour.

Boyd's literary exploration into interpretive flexibility is at its most intricate during Hope's own observations of chimpanzee violence. Pertaining to the individual researcher, Stanford introduces two key considerations involving the use of interpretive flexibility as a mode of knowledge production. The first is poignantly reminiscent of Haraway, in that 'paradigm formation may itself be subject to social influences, because research biases lead one to collect some types of data rather than others at different stages of the research history of a topic'.[148] And secondly, the impact of the individuals own subjectivity and environmental encouragements, as 'contextual biases may emerge from the circumstances in which the research is done. They represent the situating of ideas and interpretations of evidence in terms of perspective the researcher brings to the research'.[149] Through the employment of narrative strategies, Boyd's *Brazzaville Beach* is able to noncommittally explore both the positive and negative properties inherent to interpretive flexibility as a mode of knowledge production, beginning with the situational circumstance Hope finds herself in.

Hope's interpretive flexibility is reflective of her professional status at Grosso Avore as a marginal member of the community with little to no influence over matters regarding the direction of empirical enquiry nor data or publication outputs. Her low status is emphasized by her living situation: 'at the camp's northern extremity, was my hut […] a cross between a tent and a tin shack, a curious dwelling with canvas sides and a corrugated iron roof'.[150] The placement of Hope's at the periphery of the main camp is symbolic of her position as an outsider, or *other*, reaffirmed through the hybrid materiality of her hut. Hope is fully aware of her position, regarding it as 'fitting that it should go to me, on the principle that the newest arrival should occupy the least permanent building', and purports to be 'indifferent to what it might say about my status'.[151] Hope's position at Grosso Arvore is therefore reaffirmed within a pre-existing power structure;

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[147] *Ibid.*, p. 237.

[148] Stanford, p. 406.

[149] *Ibid.*

[150] Boyd, p. 14.

[151] *Ibid.*

tenuous and wholly expendable. Conversely, Hope's arrival at the most recent point in the research history of Grosso Arvore frees her from Mallabar's investigatory traditions, uncontaminated by a biased methodology that only ever looks to protect the dominant paradigms. The implication is that Hope is perhaps less likely to subconsciously interpret behavioural instances to correlate with current epistemological trends and therefore offering the potential for true behavioural insight. However, Hope's implied liberal approaches do not necessitate greater empirical accuracy, as the subjective nature of interpretive flexibility guarantees some kind of interpretive distortion during the translational stage.

Within these fictional considerations of interpretive flexibility and the specific empirical logics of field-based researches, Boyd considers what it is that contributes to make up the individual researcher. By presenting Hope's broader life experience across the novel's three narratives, Boyd can explore potential effects on her emotive personality, her scientific approaches, and especially her application of interpretive flexibility in the field. This is achieved by the installation of various dramatic parallels between Hope and the chimpanzees she observes at Grosso Arvore. As dramatic events in the novel progress, the similarities between Hope and her allocation of southern chimpanzees become more and more apparent in Boyd's narrative strategy. These moments of emotive correspondence lead Hope to project her personal experiences and situation onto proceedings, colouring the behaviours of the chimpanzees in particular ways, such as Pulul's instance of aggression as being motivationally equivalent to human understandings of deliberate cruelty.[152] The denouement of *Brazzaville Beach* witnesses Hope being exiled from Grosso Arvore, providing her with the emotive catalyst for her catastrophic involvement in the fate of the chimpanzee group and her killing of the two, as she sees it, most deliberately violent chimpanzee males, Darius and Pulul.

Preceding this moment in the novel, Hope's interpretive flexibility in the field appears habitual, working to accommodate her propensity toward scientific empiricism whilst enhancing her own ability to understand non-human animal behaviour herself. Her liberal observational approach, in comparison to her compatriots, is immediately noticeable in her allocating names to her chimpanzee group instead of serial numbers as research traditions at Grosso Arvore otherwise dictates. The systems of serialisation are established during a tense encounter with Mallabar, who 'smiled benignly at [Hope's] error' when she used the name Clovis instead of the

[152] *Ibid.*, p. 180.

serial allocation: *XNMI*. On the surface, this seems a commentary on the failings of scientific endeavour to sterilize anthropomorphic tendencies as Pollock determines:

> In (academic) scientific publications, technical language and the formulaic organization of material are designed to safeguard scientific accuracy and – perhaps equally important – the appearance of accuracy. Many field scientists find that the form cramps their style because it is wholly predictable […] Remove the scientist from the professional environment (in person or in print), and she typically refers to her study animals in thoroughly human terms, acknowledging with humour and irony that speaking of them in any other way is virtually impossible.[153]

Hope's position on the social periphery at Grosso Arvore enables her utilisation of more informal encounter strategies that better familiarize and facilitate her understanding of chimpanzee behaviour. Goodall recalls that observational practice at Gombe was a procedure caught between 'the conflicting demands between [her] approach, which was holistic and individualist, and the protocols of academic science'.[154]

Hope wholly disregards the dangers perceived by Mallabar in anthropomorphising the chimpanzees in an effort to better understand their individual characteristics and identify new behavioural occurrences, an informal indulgence shared by others at Grosso Arvore. During her investigatory observation of the aggressive northern chimpanzee group, Ian Vail originally identifies the alpha male as *N4A*. Hope then coaxes him, '[c]ome on. What's his name?' Vail eventually discloses that he actually refers to the male as Darius. This revelation is Boyd's proposition that naming has an element of value as a method by which to conduct observational study. Rees highlights such techniques correlated with trends in the identification of non-human animals in late-twentieth century, as '[n]aming was a process fraught with meaning for some observers, while for others it was more commonplace'.[155] Narratively, Boyd presents this mode of interpretive flexibility as permitting Hope a sense of better interspecies understanding. Non-human animal individuals are understood in terms of their own behavioural traditions and social

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[153] Pollock, p. 8.

[154] *Ibid.*, p. 73.

[155] Amanda Rees, 'Wildlife agencies: practice, intentionality and history in twentieth-century animal field studies', *BJHS Themes*, 3 (2018), 127-149 (p. 138).

tendencies toward others, 'to link present behaviour with past and future – or in other words, to write the animals' life histories […] as individuals became known, behaviourally and socially, so their current behaviour could be put in past context'.[156]

Fictionalizing Historiographies of Science

Like Hope in *Brazzaville Beach*, Goodall's employment of historiographical vernacular in 'the four-year war' at Gombe is an intriguing application of interpretive flexibility. It licences events with a certain gravitas, a level of significance as a landmark moment within the broader chronology of chimpanzee behaviours.[157] It is an inversion of human historiographical techniques used to better understand significant periods of history, a series of inter-group violent exchanges transferred into a manageable sequence of events, predominantly to better determine underlying motives and causalities. More importantly, historiographical vernacular is a narrative technique used to satisfy a *human* need to better understand the past, to quantify and qualify whole events retrospectively. The use of "war" presupposes a level of agency or consciousness on the part of participants, anticipating the roles of both aggressor and victim, or the victorious and the defeated, occurring within a period that has both a definitive beginning and an end. Indeed, Goodall's observational prose is crowded with incentive-loaded vocabulary, notably during her account of the Kasakela group's attack on Goliath, an older Kahama male:

> One of the students, Emilie, was present during the attack that led to Goliath's death. What shocked her most was the terrifying rage and hostility of the five aggressors […] They were definitely trying to kill him […] Emilie followed the assailants back to the north and recorded their wild excitement. Repeatedly they drummed on tree trunks, hurled rocks, dragged and threw branches. And all the time they called out, as though in triumph.[158]

Goodall's accounts are filled with similarly charged descriptions that, knowingly or unknowingly, vilify the purposefulness of the aggressors and victimise the chimpanzees attacked. The

[156] *Ibid.*, p. 138.

[157] Goodall, *Through a Window*, p. 87.

[158] *Ibid.*, p. 89.

chimpanzees are therefore caught within a historical narrative orientating around a significant event, the significance of which being only ever defined as such by observers projecting human principles and systems of morality.

Historiographical forms tend to insinuate a *before* and *after*, implying a sense of change or progression during the event and endowing a significance to events that are perhaps inappropriate to non-human animals. As mentioned, it also proposes a definitive *end* to events which is perhaps inappropriate to the ambiguous complexities of non-human animal behaviour; inferring unrelatedness to any subsequent events that occur afterward. Whether knowingly or not, Goodall bestows chimpanzee life with its own broader narrative history, a model of analysis unlike more scientific modes and a far more descriptive than analytical form of producing knowledge on non-human animal life. Crucially, it is a method by which Goodall can bypass issues of temporality, compartmentalising four-years of particularly violent chimpanzee behaviours into a more manageable outline for more effective reflection and translation to the public domain. As a form of chimpanzee social history, these historizing narratives insist a sense of linear progression. They implicate a change from one state to another and a sense of anthropological distance encouraged by narrative elements of story, fable, or mythology implied within a synthetic cultural tradition. Rees highlights this narrative approach correlated with wider trends in cognitive ethology at the time, 'since it was only in the context of those individual histories that the proximate and adaptive explanations for behaviour could be developed'.[159]

Boyd offers a fictional reimagining of these same processes of scientific historicization. When Hope's new knowledge on chimpanzee violence and cannibalism is eventually seized by Mallabar and incorporated into his existing model of knowledge, the pending publication also looks to consign the chimpanzees' behaviour into the historiographical form: '[t]he war. The chimpanzee wars they're calling them. The northern chimps – they've been systematically killing the southerners'.[160] The historicization of chimpanzee behaviour works to dramatize events and provide the final motivation for Hope's eventual tragic intervention. Indeed, Hope's last act in *Brazzaville Beach* is to commit the violence between both chimpanzee groups to the past following her own potent act of violence and using similar historiographical devices in her own

[159] Rees, 'Wildlife agencies', p. 138.

[160] Boyd, p. 370.

understanding of events, announcing that '[t]he chimpanzee wars were over'.[161] Although such a narrative strategy helps bring events in the novel to a conclusion, it conversely raises further questions regarding process of knowledge production. Do processes of historicization in scientific narratives consider knowledges produced during these episodes to be constantly active or one-off irregularities within a broader species model of behavioural knowledge? Rees asserts that '[w]hether observing individuals within groups or watching solitary animals, researchers showed animals acting with motivation and intent […] their histories had shaped their characters and present interactions'.[162]

Whilst systems of historicization exist, they operate entirely differently within the empirical sciences, as Stanford observes, '[the] history of primatology has been composed of a series of new paradigms to explain accumulating new data. These often involve dichotomies that are shown later to be false'.[163] The epistemological terrain of cognitive ethology is in a state of perpetual change, albeit very slowly, forever shifting to accommodate the new scientific discoveries and knowledge produced on non-human animal behaviours. It proposes a deviation from two fundamental principles of science that apply differently to cognitive ethological studies of non-human animals: refutation and conjecture. As previously discussed, field-based researches cannot challenge existing paradigms immediately, being reliant on revelatory behaviours displayed by the non-human animal subjects under observation. The environmental and social conditions of wild chimpanzees cannot be replicated by the repeatable modes of experimentation created in the laboratory and so ethologists depend on observations prescribed entirely by circumstance. In essence, the research direction, and broader empirical evolution of cognitive ethology, is dictated by the behaviour of non-human animal subjects, not those conducting the research. That is not to say that the principles of refutation and conjecture do not apply to cognitive ethology, as observations are translated, interpreted and theories of behavioural agency then argued for and against, but rather work differently in terms of temporal logics as dominant paradigms cannot be effectively contested until substantial evidence of a counterargument reveals itself.

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[161] *Ibid.*, p. 392.

[162] Rees, 'Wildlife agencies', p. 140.

[163] Stanford, p. 406.

Shifting Paradigms: Old Versus New Knowledges

Boyd is clearly aware of these codes of conduct specific to cognitive ethology, as any new evidence only emerges gradually over time to eventually challenge dominant empirical trends. This epistemological characteristic is explored through the fictional personification of old and new knowledges, represented by Mallabar and Hope, respectively. Boyd draws heavily from scientific organisations of knowledge ownership and intellectual property rights, concepts developed 'on exchanges between knowledgeable and consenting trading partners', though opponents contend it has led to 'issues of inequity that are inherent in the current system'.[164] Such notions of ownership emphasize a contradiction within scientific idealism regarding openness, looking to produce knowledges that can be transferred to and used within the public domain, whilst also having 'to facilitate scientific and economic benefit from innovation […] that it provides a fair and morally justifiable way of rewarding those who invest in the process of discovery and regulating access to these benefits'.[165] Boyd accentuates these two determinations and repurposes them as the basis of the underlying frictions between Hope and Mallabar, both desiring ownership of and recognition for their discoveries.

Mallabar's outright denial and obstinacy regarding Hope's observations of chimpanzee violence is markedly representative of the tensions that occur between old and new knowledges during processes of paradigm contention and displacement. Boyd creates narrative effects out of theses tensions, free from the temporal constraints that the operational scientific context would otherwise complicate, dramatizing the situation of there being 'no laws of trespass in the world of science'.[166] Establishing tensions narratively, Boyd accentuates the gravitas and potential of Hope's preliminary discoveries as she recognises the potential reverberations of her new knowledge pertaining to violent chimpanzee behaviour:

> Alongside her alarm and her shock had been another sensation: excitement. She felt lucky, almost blessed. It was Hope Clearwater who was witnessing these extraordinary

[164] Catherine Rhodes and others, 'The "ownership" of science', *Prometheus: Critical Studies in Innovation*, 29 (2011), 325-336 (p. 327).

[165] Institute for Science, Ethics and Innovation, 'Who Owns Science? The Manchester Manifesto' <http://www.isei.manchester.ac.uk/TheManchesterManifesto.pdf> [accessed 17 September 2019]

[166] Boyd, p. 225.

> events. What was taking place at Grosso Arvore was unparalleled, revelatory – no matter what explanation might be offered up later. And Hope was aware, from very early days, that there was every chance that it would be her name for ever associated with this new knowledge and understanding […] Hope was in thrall to a vision of the future in which her name glowed with lasting renown. She had to be very careful that she did not throw this opportunity away.[167]

Hope intends to consciously initiate a shift away from current empirical trends to eventually form a new paradigm of her own and condemn the one displaced into redundancy. The passage pre-empts the scientific procedures of refutation and conjecture that Hope must maintain in order to achieve recognition and success. It is the tensions that arise between these old and new knowledges that subsequently drive the following events of the novel, illustrating an ironic parallel between the capacities of both chimpanzees and humans for intraspecies violence.

OId knowledge is represented by Mallabar and his long-established research traditions at Grosso Arvore, as well as the 'scientific acclaim and increasing public renown […] [that] became genuine celebrityhood'.[168] The development pathway of Grosso Arvore resonates clearly with Goodall's research centre at Gombe; 'from small beginnings to become one of the most dynamic field stations for the study of animal behaviour in the world'.[169] Similarly, Grosso Arvore is born from Mallabar's explicit intention to conduct 'investigations into the society of wild chimpanzees' through 'scrupulous and original field studies'.[170] Boyd bestows Mallabar with all the appurtenances expected of an illustrious individual, one exalted within the scientific discipline who also transcends into the public domain:

> When he published his first book, *The Peaceful Primate*, in 1960 […] television films and documentaries followed and Grosso Arvore, along with its telegenic founder, thrived and grew. Research grants multiplied, eager PhD students offered their services and government influence broke through the hitherto impenetrable barriers of red tape […] Then came the international success of Mallabar's next book, *Primate's*

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[167] *Ibid.*, pp. 243-244.

[168] *Ibid.*, p. 27.

[169] Goodall, *Through a Window*, p. 20.

[170] Boyd, p. 27.

> *Progress*. Invitations, citations and honours followed; Mallabar became the recipient of a baker's dozen of honorary doctorates […] chairs in Primatology were established in Berlin, Florida and New Mexico. Eugene Mallabar's place in the annals of science and ethology was secure.[171]

Mallabar's two publications are representative of the active and long-reigning dominant paradigm concerning chimpanzee behaviour that Hope must eventually engage, contest, and eventually displace. The professional accolades Mallabar has consequentially collected not only accentuate the prestigious position within his discipline, but also reemphasize the relative professional security he enjoys. So established is Mallabar's current empirical paradigm, that when Hope relays her hypothesis to her colleague Ian Vail, he instantly retorts '[b]ut it's so odd. So out of the blue […] it doesn't fit the data'.[172] The reader thus realises that chimpanzee behaviours at Grosso Arvore are fitted into a predetermined model of knowledge, entirely closed off to any new behavioural potentialities that *should* govern the composition of the model from the beginning. In essence, Mallabar's model of knowledge is fixed, rather than fluid, and nonadaptive to instances of genuine revelation. In a narrative sense, this reiterates the magnitude of Hope's empirical task, especially in comparison to her more unestablished position: 'someone like you – I mean, a new arrival'.[173] The rupture in the chimpanzee social group at Grosso Avore foreshadows the impending threat to Mallabar's active empirical paradigm of primate behaviour that Hope comes to represent. The potentialities of these new knowledges are insinuated to have the same epistemological reverberations experienced throughout the field of primatology as Goodall's initial observations of chimpanzee infanticide in the 1970s.

Throughout Boyd's narrative, old and new knowledges are signified by motifs relating to empirical design and scientific literature, the primary medium of scientific productions of knowledge of non-human animal life in the field. For example, Hope's observations are always carried out with 'analysis sheets ready […] field journals open', documenting behaviours and collecting data.[174] Later, the transcribing process commences, as she recalls 'writing up my field

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[171] *Ibid.*

[172] *Ibid.*, p. 205.

[173] *Ibid.*, p. 373.

[174] *Ibid.*, p. 31.

notes […] I described the day's events precisely, and made no alterations to the data'.[175] Certainly, every foray into Boyd's fictional field is notably concluded by Hope always 'writing up my field notes for the day' back at camp.[176] The narrative constantly reminds of the continuous scientific modes of knowledge production and their own resultant narratives, what Haraway describes as 'the act of fashioning, forming, or inventing'.[177] These translational processes by which knowledge is captured when researching on non-human animals which, by simply having been written down, is then immediately converted into intellectual matter and property. Mallabar and Hope are both bound to these legitimized scientific literary modes of conduct; the epistemological medium by which to either defend old knowledge or promote and circulate new. These physical configurations of knowledge become dramatic devices through which Boyd can explore the transitional stages of knowledge production: from raw data into scientific materials that are then passed into the public domain. Through physical representation, both old and new knowledges move from conceptual oppositions to tangible objects to depict the tensions between them. These include assertions of authority, shifts in power, and issues of ownership during exchanges between Mallabar and Hope.

In *Brazzaville Beach*, all empirical researches and the knowledges produced by them are signified through the motif of scientific literature. Mallabar's two seminal publications, Vail's paper on the sexual and social strategies of female chimpanzees, and Hope's eventual article on infanticide and cannibalism are all representative of distinctly separate behavioural characteristics yet are interrelated within the model of knowledge on chimpanzee life. When Mallabar realises Hope's discovery represents a very real and distinct threat to his research traditions and dominant paradigm on chimpanzee behaviours, he moves to quickly close down her avenues of legitimizing and circulating the new knowledge. Boyd dramatizes this tension to drive events in the novel, as Hope describes:

> Later, I walked back alone up the track to Grosso Arvore, hefting a thick bundle of daily field records under my arm […] I wasn't entirely sure what I was going to do with all this data, to tell the truth, but it seemed to me clear that if Mallabar and Hauser

[175] *Ibid.*, p. 40.

[176] *Ibid.*, p. 38.

[177] Haraway, *Primate* Visions, p. 3.

> wanted my records destroyed, then it would be prudent for me to try and reproduce some copy of my own research.[178]

As knowledges are symbolically contained within Hope's scientific materials, Boyd can narratively represent increasing tensions by having characters actually *possess* the knowledges in a physical configuration.

Later, Hope returns to discover her hut has been deliberately disturbed, her papers and journals having been read by an unnamed intruder. A few days later, her hut inexplicably burns down through insinuated foul play. The motif of her new knowledges turned to '[b]lack soaked lumps. Cinders […] All my field notes and journal'.[179] During that time, Hope's new knowledge is gone, 'a year's data gone up in smoke', so bound are scientific methods of knowledge production to literary material form.[180] Due to Hope's relatively low position within the professional hierarchy of Grosso Arvore and wider scientific community, having none of the reputational influence or professional accolades as Mallabar, the new knowledge contained within her scientific materials poses the greatest threat to him. As Hope notes, in the eyes of her colleagues, '[e]ven the destruction of my field notes was of minor significance. My job at Grosso Arvore was no more than a watching brief; the main body of work at the project would be unaffected by the loss of my data'.[181] A few pages on, Hope learns that her field assistant João had kept copies of the observational field notes, and so the potentialities of the new knowledge are restored; with Hope declaring '[w]ell done, Joao […] We're going to be famous'.[182]

Frictions between Hope and Mallabar are not limited to indirect skirmishes, as Boyd orchestrates a number of direct and volatile engagements between two representatives of both knowledges to interact, discuss, and explore their motives. There is a blatant sociobiological parallelism between the tensions and volition between Hope and Mallabar and then between the chimpanzees, installed by Boyd to emphasize concepts of intra-group tribalism, territorialisation, and dominance that operate in both nature and, ironically, the empirical sciences. As the

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[178] Boyd, p. 127.

[179] *Ibid.*, p. 116.

[180] *Ibid.*, p. 118.

[181] *Ibid.*, p. 117.

[182] *Ibid.*, p. 122.

instances of violence, cannibalism, and infanticide among the chimpanzees become recurrent, Hope goes to Mallabar a number of times with her emergent hypothesis. Boyd sets up power hierarchies during these exchanges, as Mallabar's authoritative position allows him the gravitas of 'the wise headmaster confronted by the difficult pupil'[183] keen to warn Hope of the 'potential damage of wild […] hasty theorizing'.[184] Mallabar deems Hope's verbal account of the first serious instance of chimpanzee violence, Rita-Lu and Rita-Mae's killing and consumption of infant Bobo, as simply a 'fantastical story' and threatens 'if you persist in these fabrications, if you repeat them to anyone outside this room, I will have to terminate your employment here, immediately'.[185] Later Mallabar directly intervenes to halt Hope's process, stating 'these allegations you've made are pure speculation. You are jumping to conclusions based on the patchiest data. Bad. Bad science, Hope […] You are wrong'.[186] Mallabar's utter rejection emphasizes the threat presented by Hope's new knowledge regarding his current paradigm and scientific establishment. Narratively, Hope's newfound knowledge embodies empirical truth, implicating Mallabar's work to be mendacious as the current model of knowledge concerning chimpanzee behaviour. Mallabar thus becomes an unlawful obstacle in the way of legitimate epistemological progress, an outright rejection of the objectivism expected of scientific empiricism.

In response, Hope commences the next phase of scientific knowledge production: the official publication. Boyd reemphasizes the medium and strict processes of scientific conduct, as Hope describes:

> I worked hard that night. By the time I went to bed I had most of my article drafted out. I was pleased with my title too: 'Infanticide and cannibalism amongst the wild chimpanzees of the Grosso Arvore project'. The peaceful primate's days were over.[187]

The deliberate wordplay evoking Mallabar's own publication here is a dramatic reimagining of the processes concerning paradigm contestation and displacement within the empirical sciences. As Hope sculpts these new knowledges into an official publication, it becomes legitimised by

[183] *Ibid.*, p. 39.

[184] *Ibid.*, p. 40.

[185] *Ibid.*, p. 132-133.

[186] *Ibid.*, p. 236-237.

[187] *Ibid.*, p. 133.

narrative practices determined to be inherent to scientific conduct, ready to be transferred to and circulated amongst the scientific community and then potentially the public domain. Mallabar's supposed conviction in his own materials is eventually revealed to be total denial of any other behavioural possibilities, deluded by his belief that 'I know more about chimpanzees than any living person, more than any person in the history of mankind'.[188] His incessant self-adulation culminates in a physical assault on Hope toward the end of the novel. Right to the last, Mallabar still refuses to acknowledge legitimate observations of chimpanzee violence and cannibalism, as he accuses Hope: '[i]t's you. It's something you've done to them […] WHAT HAVE YOU DONE?'.[189]

Significantly, the same terms of epistemological engagement play a crucial role in Hope's eventual failure to circulate the new knowledge and claim ownership over it. After fleeing Mallabar's violent attack, Hope is consequently held captive by a paramilitary group for a time. Upon her release and eventual return, Hope is presented with her original contract of employment:

> I read it. I had to smile. All publications, its gist ran, based on original research carried out at Grosso Arvore, were the copyright of the Grosso Arvore Foundation, unless alternative permission were given. All data gathered was similarly protected and had to be surrendered to the Foundation for its archives on terminations of employment.[190]

Hope's absence allows Mallabar enough time to employ the legislative protections available to him resultant of his authoritative position and reputation, a characteristic particular to scientific systems of knowledge production and ownership. Hope is removed from the empirical environment of Grosso Arvore; a space with legal indemnification that authorises the productions of knowledge as well as the *way* they are then utilised. Through her expulsion, Hope loses ownership of her original knowledges and her access to the epistemological processes by which to produce, develop, and distribute them and potentially others. Notably, the projected impact of the new knowledges on chimpanzee violence and cannibalism remains unchanged, eventually incorporated by Mallabar into his work; as Hauser informs Hope: 'Everything's changed. The

[188] *Ibid.*, p. 237.

[189] *Ibid.*, p. 265.

[190] *Ibid.*, p. 375.

book's postponed. The feeding area's been closed down […] The war. The chimpanzee wars they're calling them […] That's why the book is being rewritten'.[191]

Conclusion

This chapter has analysed the ways in which *Brazzaville Beach* fictionally represents field-based scientific practices as a critique of its operational epistemological logics that ultimately dictate the *kinds* of knowledges produced on non-human animal life. Focusing particularly on the logics of temporality, scientific modes of temporal control applied to the natural environment, and the influence of interpretive flexibility, the chapter argues that literary strategies available to contemporary authors can effectively navigate, present, and accentuate working epistemological logics to consider their influence on the experience of both the non-human animal and human researcher and the interspecies encounters engendered within the setting. Such an analytical approach has the great potential to reconsider the non-human animal throughout field-based practices more broadly and to prompt a re-examination of scientific, humanist language-based methods of observation, translation, representation, and misrepresentation, as the best way to produce knowledge concerning non-human animal life in this situation. The thesis now moves to consider contemporary literary representations of the scientific laboratory setting, to examine whether specific epistemological logics that shape non-human animal experiences there can be reconsidered most effectively through implementing the same or other, different kinds of literary strategy.

[191] *Ibid.*, p. 370.

Chapter Two

'Through the bars': Literary Reconfigurations of the Laboratory Space

> The entire facility was designed to make it easier for the workers to have access to the chimps' blood. Sterile-gowned technicians came around on schedule to inject the chimps with hepatitis B vaccine, or to challenge the vaccine with live hepatitis virus, or to draw their blood to see whether the vaccine was effective. The chimps did not stop signing, though the technicians didn't understand them. We heard from visitors that Booee, Bruno, Nim, Ally and others kept asking the techs in ASL for food, drinks, cigarettes and the keys to their cages.
>
> – Roger Fouts, *Next of Kin*[192]

The history of the non-human laboratory animal correlates with that of both the human empirical sciences and the laboratory space. However tenuous, the physiological, pathological, and psychological similarities between humans and non-human animal species ensures their consistent use as explorative vehicles in the construction of cognitive and biological models, often in order to better understand corresponding human systems. Non-human animals are ubiquitous within the broad and extensive history of human medicine; ever-present in its development from the time of classical antiquity to modern-day practices.[193] More recently, a large proportion of non-human animals have found themselves utilised within biomedical researches, burdened with the promissory future of securing health benefits for human society. During the mid-twentieth century, non-human animals were taken into the laboratory space to assist in the development of psychology. The sub-fields of cognitive ethology and comparative psychology were born; the former is an exploration of natural non-human animal behaviour and the latter an extension of human psychology that identifies and compares correspondent evolutionary developments, such

[192] Roger Fouts, *Next of Kin: My Conversations with Chimpanzees* (London: Penguin Group, 1998), p. 274.

[193] Nuno Henrique Franco, 'Animal Experiments in Biomedical Research: A Historical Perspective', *Animals*, 3 (2013), 238-273.

as cognitive learning, in non-human animal cognition.[194] The modern laboratory provided these sub-divisions of the empirical sciences with an autonomous environment in which to conduct these experimentations on non-human animal life; it is a space regulated and protected by humanist conceptualisations of scientific idealism.

The scientific basis of this chapter will concentrate on a significant episode in the history of the non-human animal in the laboratory space, evidenced in the extract of Roger Fouts' *Next of Kin*: the utilisation of primates during mid-twentieth century cognition and biomedical experimentations. In an official scientific capacity, primate research subjects have existed since 1930 and the founding of the Yerkes National Primate Research Centre in Atlanta, U.S. under comparative psychologist Robert Yerkes. He established the first large-scale laboratory-based studies of primate intelligence and learning capabilities, including group social behaviours, individual learning and sensory capacities.[195] Yerkes' studies were symptomatic of a wider scientific movement, a human fascination with primate cognition and their potential to illuminate the pathways of our own evolutionary development.[196] Catalysed by post-war technological breakthroughs in medicine and the global HIV/AIDS epidemic of the late twentieth century, chimpanzees became the obvious biological model against which to test pathological hypotheses and potential treatments. Only recently have these genetic similarities been challenged as providing an accurate biological framework for improving human health.[197] In terms of chimpanzee populations in the empirical sciences, due to population restrictions determined by issues of availability and financial cost, there has been historically an interexchange of non-human animal subjects between cognitive and biomedical fields; both permanently situated within the laboratory space. The result has been a chimpanzee population continuously subjected to physical and psychological experimentation for decades, the psychiatric ramifications of which are only just being realised by those both in and outside of the empirical sciences.[198]

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[194] Lewis Barker and Jeffrey S. Katz, 'Animal Learning and Animal Cognition', in *Handbook of Research Methods in Experimental Psychology*, ed. by Stephen F. Davis (Oxford: Blackwell Publishing Ltd, 2003), 241-262.

[195] Robert Yerkes, *Chimpanzee: A Laboratory Colony* (Yale University Press, 1943).

[196] Erin McKenna, 'Pragmatism and Primates', *American Journal of Theology and Philosophy* (2001), 183-205.

[197] Jarrod Bailey, 'Lessons from Chimpanzee-based Research on Human Disease: The Implications of Genetic Differences', *ATLA*, 39 (2011), 527-540.

[198] Animals and Society Institute, *The Bioethics of Great Ape Well-Being: Psychiatric Injury and Duty of Care*, ed. by Theodora Capaldo and G. A. Bradshaw (Ann Arbor: Animals and Society Institute, 2011).

The ultimate purpose of this chapter is to examine the way in which fictional literary strategies can offer effective re-evaluations of the investigative systems employed within the modern laboratory environment using two examples of contemporary fiction: Colin McAdam's *A Beautiful Truth* and Karen Joy Fowler's *We Are All Completely Beside Ourselves*. With this key objective in mind, the chapter maps out five different ways in which fiction can undermine and complicate the epistemological logics of the laboratory setting that uses non-human animals. Firstly, how contemporary literature depicts and negotiates *around* systems of autonomy that present the laboratory as an isolationist construction being spaces hermetically sealed off from the social world. Then how these same strategies that open up the laboratory space navigate around the logics of scientific empirical investigation to reconsider the broader non-human animal experience, otherwise never acknowledged by scientific practice. Thirdly, to highlight advantages of literary strategy in contextualising current empirical paradigms and methodological practices within a broader historiography of laboratory practice in order to challenge conceptualisations of total scientific objectivity and the wider implications this has on non-human animal experience. Fourthly, how fiction can help to expose and critique scientific systems of visibility and invisibility pertaining to the use of non-human animals in the laboratory space, and the ethical and moral issues that these complicate. And lastly, how fiction encourages a sense of constructive scepticism regarding scientific exaltations of particular modes of knowledge production that in turn create particular *kinds* of knowledge. This final enquiry focuses on scientific employments of human language, specifically the scientific vernacular, as the primary form through which to capture and relay the complexities of non-human animal life and how these two fictions propose *other* modes of communication can facilitate different kinds of valuable encounter and exchange between humans and non-human animals within the laboratory. To effectively examine these characteristics of the laboratory as both a physical and conceptualised space, this chapter takes from and applies Bruno Latour's theoretical approaches to critique epistemological procedures and practices to isolate key queries and conceptual oppositions to weigh against textual examples identified within the literature. For now, considerations of the laboratory will focus predominantly on broader, more general epistemological features, as more detailed enquiries into explicit modes of scientific empiricism are reserved for Chapters Three and Four.

Latour's sociological studies of the laboratory environment determine that empirical science is fundamentally the same as any other social process, practice or activity. Latour's

revolutionary approach offers a framework against which to consider the deliberate construction of scientific facts within the laboratory space, and is so used throughout this chapter. Michel Foucault's excavations into the epistemological origins of the human sciences in his seminal work *The Order of Things* will also ensure scientific empirical research is regarded as a part of a historiography of science with its own underlying, socially constructed epistemological foundations that determine the nature and direction of scientific investigation. Featured later in the chapter, Foucauldian theory offers valuable deconstructions of the institutionalised space which in turn contribute to understandings of the nature of laboratories in late-twentieth century America. These two theoretical approaches offer a reinterpretation of the laboratory complementary and conducive to the main objectives of the chapter, the interdisciplinary ambitions of which necessitate the need to, in places, delineate the history and characteristics of scientific movements to extricate and assimilate valuable considerations. This in turn will help examine the ways in which literary efforts articulate these same epistemological features of knowledge production concerning non-human animal life in the laboratory setting and broader implications of animal ethics.

Introducing the Fictional Texts

In relation to the key investigative aims of the chapter, this section has two objectives. Firstly, to introduce Colin McAdam's *A Beautiful Truth* and Karen Joy Fowler's *We Are All Completely Beside Ourselves*. These introductions will include an outline of the key epistemological logics of the laboratory space that each text is interested in exploring, as well as a summary of each novel's narrative in order to better identify the non-human animal presences that feature. Secondly, to provide an initial overview of *how* the authors look to draw attention to the epistemological contestations at work within the laboratory space as an environment that produces knowledges on non-human animal life. Advantageous to this second objective are the auxiliary works of Laura Jean McKay and Matthew Calarco into notions of otherness and limitations of language as an empirical measurement of non-human animal intelligences, respectively. Catherine Parry's examinations into the limitations of the scientific vernacular by which to record, translate, and then document non-human animal capacities will also feature. The critical approaches of McKay, Calarco, and Parry provide a set of initial approaches by which to consider key thematics in McAdam and Fowler's texts, forming a framework against which to

consider the implications of those thematics, and others identified by omission, specific to the laboratory setting.

Colin McAdam's *A Beautiful Truth*

A Beautiful Truth offers a fictional reconsideration of two spaces that have played host to human and non-human animal encounters: the domestic and laboratory. Whilst the domestic space is not the investigative focus of this chapter, it must be acknowledged as fictional reconstructions feature throughout both novels. More significantly, comparisons between the two settings offer fictional authors a literary strategy by which to conversely identify and accentuate conceptual oppositions within the laboratory space by moving non-human animals between the operative logics of the domestic and laboratory settings. By showing the domestic setting, it is impossible not to read the non-human animal in the fictional institutionalised space of the laboratory against the affective potentials experienced during their time in the domestic space and the valuable comparisons it engenders. *A Beautiful Truth* works to influence our understanding of laboratory-based research on non-human animals by considering the wider life experience of both the researcher and non-human animal subject by setting it against the epistemological logics of the empirical laboratory setting and the interspecies encounters engendered there. McAdam is particularly interested in issues of temporality, scientific idealisations of the laboratory as a constructed conceptual and physical space, and dogmatic empirical practices that produce particular *kinds* of knowledges concerning non-human animals in particular kinds of ways.

McKay considers how *A Beautiful Truth* looks to navigate issues of otherness in human-non-human animal relationships, exploring notions of territorialisation in the domestic environment, buoyed by the conceptualised approaches of the human and non-human divide by theorists that include Margot Norris, Donna Haraway and Val Plumwood. [199] These supplementary approaches are introduced to 'allow a discussion of novels that challenge the human/animal binary, and reveal what interspecies relationships may look like when the binary is destabilised, reversed or

[199] Laura Jean McKay, 'Crossing the Threshold: Domestic Territory and Nonhuman Otherness in Colin McAdam's A Beautiful Truth', *Otherness: Essays and Studies*, 5 (September 2016), 231-253 (p. 231).

eradicated'.[200] McKay delineates the domestic space as 'marked out as home by humans and other animals', expanding the notion of territory to include physical bodies.[201] McKay recognises the aptitude of literary fiction to reimagine the domestic setting as 'a space that is shared, transgressed and disputed by humans and other animals […] […] where animal minds are imagined into human worlds and vice versa'.[202] McKay continues to explore domestic territories in *A Beautiful Truth* as a conceptualised space that accommodate reconsiderations of agency, the deterritorialisation and reterritorialisation of bodies, as well as the broader implications on physical space within the overarching framework of theoretical approaches to notions of *otherness*.

Conversely, McAdam's representation of the laboratory space is one 'that takes human territorialisation to a level where other bodies are […] resources to be owned, manipulated and discarded'.[203] During the novel, Looee, a male chimpanzee adopted by a human surrogate family, is incarcerated into a U.S. biomedical facility during the mid-1970s. As McKay describes, he is 'confronted with the horror of his own otherness: he sees the chimpanzee as he himself has been seen by humans, and the horror is almost insurmountable'.[204] Looee's struggles symbolize what McKay deems to be a 'challenge to the notion of de- and reterritorialization': the change from one environmental logic to another.[205] McKay's ensuing considerations focus on the invasive procedures made upon Looee's physical body and psychological situation, actions predetermined and justified against his otherness. She focuses predominantly on the psychological fallout of his human cohabitation and upbringing, being 'unable to rectify his human experiences with his nonhuman physicality […] his animal companions with his human memories'.[206] Therefore, in McKay's examination, the laboratory is only ever considered as secondary to the domestic space, implicated by Looee's past and memories made there. Although McKay's analytical concern is to explore McAdam's fictional representations of the domestic space, she conversely raises an intriguing proposition regarding the laboratory space. How can fictional strategies offer a way by

[200] *Ibid.*, p. 235.

[201] *Ibid.*, p. 233.

[202] *Ibid.*

[203] *Ibid.*, p. 251.

[204] *Ibid.*, p. 243.

[205] *Ibid.*, p. 245.

[206] *Ibid.*, p. 248.

which to explore the potentialities of human and non-human animal encounters within this empirical environment?

Published in 2013, *A Beautiful Truth* alternates between two central narratives based in these two narrative settings: an interspecies cohabitation study in the domestic home and the scientific laboratory. The principal narrative orientates around Looee, an adolescent male chimpanzee, who is adopted by a human couple, Judy and Walt Ribke, and the relationship between them. The novel offers the narrative perspectives of Looee, Judy and Walt, and features differing interpretations of events and interactions during their period of inter-species co-habitation during the 1970s in rural Addison County, Vermont. The second narrative concerns the non-human animal inhabitants and their human researcher at a laboratory conducting biomedical and language studies based in Florida, named the Girdish Institute. This narrative is halved, on one hand exploring the social relationships within of a community of chimpanzees under ethological observation – Ghoul, Mama, Podo, Fifi, Jonathan, Magda, Rosie, Billie and Burke – and on the other the studies and introspective reflections of head cognitive ethologist, David Kennedy. The novel's inciting incident revolves around an act of severe violence on the part of Looee, who afterwards finds himself in the laboratories of the Girdish Institute. The merging of these two narrative threads sees Looee become the subject of biomedical experimentation, though later reduced to behavioural observations, and housed with other chimpanzees for the first time in his life.

McAdam sets the novel during the chimpanzee cognition sign-language and cohabitation studies of the 1960s and 1970s, which also coincided with the dominance of biomedical experimentation on primates during extensive AIDS and HIV biomedical researches of the 1980s.[207] Looee's narrative sequence is recognisable in the life histories of many actual incarcerated chimpanzees; subjected to constant invasive biomedical experimentation for years after cognition studies were determined to have failed. McAdam does not offer what could be considered to be a satisfying denouement at the end of the novel, as Looee never escapes the empirical environment of David's research facility. Instead, he leaves readers to contemplate the

[207] Jarrod Bailey, 'An Assessment of the Role of Chimpanzees in AIDS Vaccine Research', *ATLA*, 36 (2008), 381-428.

ethical implications of the utilization, treatment, and artificiality of non-human animal existence in the scientific laboratory setting.

Karen Joy Fowler's *We Are All Completely Beside Ourselves*

Karen Joy Fowler offers an alternate fictional laboratory space by which to reconsider the potentialities of human and non-human animal encounters that occur there. Like McAdam's novel, *We Are All Completely Beside Ourselves* is predominantly interested in epistemological logics concerning issues of temporality and the empirical laboratory as a conceptually and physically delineated space, as well as the situational circumstances this then places them into. Additionally, Fowler also offers an investigation into scientific adulations of language as the benchmark by which human regard and treatment of non-human animals are determined within the laboratory, and the types of human and non-human animal encounter this engenders. In terms of how *We Are All Completely Beside Ourselves* affects our understanding of laboratory-based science, Fowler enforces a reflection of laboratory practices and procedures through a distinct blurring of human and non-human animal species lines through the cohabitational upbringing of a human child and chimpanzee infant in the narrative and then by placing the chimpanzee within the epistemological logics of the laboratory setting later. These empirical practices can then be seen within the broader context of this shared upbringing to consider the role of memory and the situational circumstance that the laboratory space places non-human animals into.

Calarco explores the notions of indistinction and radical alterity.[208] He begins by establishing the exaltation of language as the way by which to attain 'full admission to the human community' through a close analysis of Franz Kafka's *A Report to an Academy*, extracts of which preface the prologue and the six parts of Fowler's text.[209] Presenting Kafka's work as 'a challenge to its readers to rethink the limitations of human language as well as the structures and processes through which becoming human takes place', Calarco resumes to offer an interpretation of Fowler's novel

[208] Matthew Calarco, 'Boundary Issues: Human Animal Relationships in Karen Joy Fowler's We Are All Completely Beside Ourselves', *MFS Modern Fiction Studies*, 60 (2014), 616-635 (p. 624).

[209] *Ibid.*, p. 616.

as 'one possible and provisional response' to such a challenge.[210] Calarco argues that *We Are All Completely Beside Ourselves* questions the fundamental scientific idea that although language has 'long served as the definitive marker of human specificity and uniqueness', it actually threatens to 'miss all of the various capacities and possibilities that animals have and that, by contrast, human beings might lack [..] [and how] language fails to measure up to the richness and difficulty of reality'.[211] Calarco scrutinises the way in which the anthropocentric approaches of scientific empiricism maintain language as the benchmark against which to define boundaries of alterity or *otherness*. Borrowing from the philosophical approaches of Jacques Derrida and Friedrich Nietzche to renegotiate these terms by which language signals human propriety, Calarco offers that 'human language has no clear or privileged access to truth'.[212] Referring to specific instances in the novel, Calarco presents an argument for greater indistinction between human and non-human animals and a recalibration of those relationships, concluding that 'indistinction opens us onto a realm of fundamentality unknowable and anticipatable relations and possibilities'.[213] This reverberates potently with Fowler's proposition in the novel 'to start from a place of congruence' from which to renegotiate the human and non-human animal relationship.[214]

Conceding that current anthropocentric parameters run into 'domains well beyond the boundaries of scientific inquiry', Calarco proposes that the ideological root of the human/non-human divide are nevertheless greatly influenced by scientific outputs, and that 'when those ideological coordinates are called into question, the injustice of the established order is brought to the fore'.[215] Fowler's Fern is a female chimpanzee removed from her surrogate family to a biomedical facility, occupying the laboratory found at the epicentre of Calarco's ideological coordinates in the novel. Dissimilarly to McAdam, Fowler's domestic space is one with empirical undertones, as Fern is there as part of a cognitive development experiment. Upon admission to the laboratory space, Calarco notes 'once [Fern] enters the world of the laboratory she is taught which side of the distinction she belongs to with brute force: she is literally caged by her human

[210] *Ibid.,* p. 617.

[211] *Ibid.*, p. 618.

[212] *Ibid.*, p. 621.

[213] *Ibid.*, p. 627.

[214] Karen Joy Fowler, *We Are All Completely Beside Ourselves* (London: Serpent's Tail, 2014), p. 202.

[215] Calarco, 'Boundary Issues', p. 622.

handlers […] all in the name of becoming an object of research'.[216] Similarly to McKay, Calarco observes the ethical and psychological implications of moving Fern, raised in tandem with Rose her human surrogate sister, into a space ideologically independent that 'effectively rendered Fern's body and life commodifiable and sacrificeable'.[217]

Significantly, Calarco observes the way in which Fowler offers an interpretation of the laboratory space, and 'the ways in which human-animal relations get recoded and reterritorialized by the established order'.[218] Calarco's established order pertains to the intellectual sovereignty of scientific empiricism and its ultimate dictation of human and non-human animal relations more broadly. Poignantly, and beneficially to the investigative aims of this chapter, Calarco continues:

> What is thought-provoking about Fowler's novel, though, is that her characters' affects and sense of responsibility for animals do not stop at these standard and recognizable familial borders […] [w]hat is likely more difficult for some readers to absorb is how such relationships can cause affects, passions, and identifications with animals to spread beyond those limits.[219]

Comparable to McKay's observations of human-non-human animal relations in the domestic space, Calarco incites a deliberation of the ways that fictional representations can extrapolate similar considerations of the laboratory space. Equally, Calarco's considerations catalyse intriguing considerations of the same approaches of the fictional laboratory. What are the standard and recognizable borders or limits of these human and non-human animal encounters within the laboratory, and do the same manifestations of affect and identification exist there? How can reconstructions of the laboratory in literary fiction offer original and interesting ways of thinking about these human and non-human relationships?

Catherine Parry considers the ability of *We Are All Completely Beside Ourselves* to both question and reconsider anthropocentric approaches to the human and non-human animal

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[216] *Ibid*.

[217] *Ibid.*, p. 630.

[218] *Ibid.*, p. 629.

[219] *Ibid.*, p. 631.

relationship in 'The Sameness and Difference of Apes'.[220] Similarly to Calarco, Parry regards Fowler's novel as querying the exaltation of language, and that 'the quality of cognition and distinctively rich mode of engagement with the world it is taken to imply […] is the traditional way of defining ethical obligations to animals'.[221] Parry offers an intriguing reconsideration of a linguistic development test, disguised as a game, that Rose and Fern play under behavioural observation during infancy. Parry proposes this game 'evokes the history of similitude and exclusion in human-ape relations […] destabilising assumptions about what humans think they and chimpanzees really are'.[222] Conversely, Parry outlines the scientific, methodological particulars of such a test, noting '[t]he rules [Fern] must play by strictly prescribe her answers […] Fern's rule-bound game (among other problems in its design and assumptions) does not search for the workings of her imagination […] [it] ignores the unknowability of what it enquires into'.[223] Although this specific example of cognitive testing occurs in the domestic space, Parry inadvertently questions the fundamental policies and practices of broader scientific investigation regarding the non-human animal. Her considerations solicit further key questions: can fictional representations of the laboratory space offer a similar review of the practices it maintains on human and non-human animal encounters? Do literary reconstructions of the laboratory provide an opportunity to find value in moments that can legitimately contribute to discussions of human-non-human animal relations? Can fictional reconsiderations of the laboratory space and its practices help further elaborate on, what Parry deems to be, 'the limit humans have erected between themselves and apes', and excavate examples of human-non-human animal interaction *missed* by these processes?

We Are All Completely Beside Ourselves shares many of the same thematic characteristics, background material and influences as McAdam's novel. The opening exposition finds the protagonist-narrator, Rosemary Cooke, struggling to deal with the familial fallout of a failed co-habitation experiment conducted by her father during the 1970s. By beginning in media res, Fowler encourages readers to ground themselves in Rose's recollection of her co-species upbringing and its effect on characters up to the narrative present of 1996. Rose's narrative thus

[220] Catherine Parry, 'The Sameness and Difference of Apes', in *Other Animals in Twenty-First Century Fiction* (Palgrave Macmillan, 2017), 169-225.

[221] *Ibid.*, p. 170.

[222] *Ibid.*, p. 207.

[223] *Ibid.*, p. 208.

orientates around and is defined by her relationship with Fern, the resultant abandonment of her older brother Lowell, and emotional alienation from her parents. Rose struggles to establish her own sense of identity following Fern's forced ejection from the family dynamic, the catalyst of which is a violent incident on the part of Fern. Rose refuses to frame her experiences and relationships with Fern as simply the methodological design of her father's behavioural study, with the developmental ramifications blatantly apparent throughout. Indeed, Fowler portrays Rose as someone half of a whole; her mannerisms are punctuated with those of Fern to form a fusion of multi-specie socio-interactive characteristics consisting of vocal, sign, and touch communications that emit from their inter-species upbringing. Rose considers her identity trapped somewhere between two worlds as *other*, struggling to completely interact and immerse herself in human society due to emotive and behavioural reverberations of her childhood with Fern and befriending other individuals who occupy the same social periphery. After reuniting with Lowell, who now operates within the Animal Liberation Front, Rose learns that Fern has spent the intervening years in and out of various biomedical laboratories throughout the country.

The critical approaches of McKay, Calarco, and Parry valuably address specific conceptual problematics of otherness, territorialisation, and the inherent anthropocentrism of scientific approaches, such as the utilization of language, that predetermine the relative limitation of knowledges concerning non-human animals produced in the laboratory space. However, their considerations do not elaborate on how human and non-human relations and encounters are constructed and then operate *within* the laboratory specifically, determined by epistemological characteristics fundamental to this particular empirical setting and congenital idealisations of the laboratory as a conceptual and physical space. More explicitly, they do not fully consider the nature of human and non-human animal encounters occurring under the specific operational empirical logics of the laboratory space. Therefore, to return to the key investigative aims of this chapter and effectually facilitate such considerations, the useful theoretical approaches of Bruno Latour will be employed and outlined in the following section. As such, Latour's deconstructive approach will offer the methodological framework by which to analyse fictional depictions of the laboratory space by McAdam and Fowler and the experiences of the non-human animal situated within the physical space as well as the empirical systems of knowledge production that operate within it.

Into the Laboratory with Bruno Latour's *Laboratory Life*

This section introduces Bruno Latour's theoretical approaches to the laboratory setting that will be borrowed from to analyse the conceptualised scientific ideal of "the laboratory" and isolate key epistemological features. These can then be more directly compared against literary instances that look to reconsider these same empirical mechanisms. Latour's *Laboratory Life: The Construction of Scientific Facts*, co-written with Steve Woolgar, offers one such conceptualised approach. Latour is a preeminent figure in the field of science and technology studies, an amalgamation of anthropological, philosophical, and sociological approaches that looks to critically examine and reconsider the empirical sciences. Latour's seminal works have influenced the critical approaches of others such as Donna Haraway, Vinciane Despret and Jane Bennett, all of whom feature throughout this thesis. Published in 1979, *Laboratory Life* is a comprehensive study pertaining to the material laboratory space and the technologies that enable extractions of truth and the production of knowledges. Intriguingly, the anthropological quality to *Laboratory Life* carries all the hallmarks of an ethological study conducted in the field, accentuating a sense of distance that emphasizes Latour's blatant scepticism of the epistemological foundation and cultures of both the sciences and the scientist. Crucially, Latour's approaches present a useful overview and breakdown of empirical processes, beneficial to the broader aims of this chapter to analyse literary reconstructions of these same procedures.

Laboratory Life is based on Latour's own first-hand observations of the daily routine and empirical activities of the Salk Institute in San Diego, U.S. Reminiscent of the fictional instances of Shelley, Hawthorne and Wells, Latour's anthropological vernacular conveys an image of the laboratory as existent apart from the social world; a space to be visited and observed with its own dialects and customs. Upon first admittance to the laboratory, Latour offers this consideration:

> When an anthropological observer enters the field, one of his most fundamental preconceptions is that he might eventually be able to make sense of the observations and notes which he records […] No matter how confused or absurd the circumstances and activities of his tribe might appear, the ideal observer retains his faith that some kind of systematic, ordered account is attainable. For a total newcomer to the

> laboratory, we can imagine that his first encounter with his subjects would severely jeopardise such faith.[224]

Latour's introductory overview underlines that each laboratory differs from one to another, despite the scientific ideal of centralising methodologies and empirical practices. He proposes that his choice of anthropological narrative is actually 'intended to dissolve rather than reaffirm the exoticism with which science is sometimes associated'.[225] Latour acknowledges the limitations of interpreting a devoutly empirical space through such a narrative, but argues that whilst 'the notion of a total newcomer is unrealisable in practice […] [a] description of science cast entirely in terms used by scientists would be incomprehensible to outsiders'.[226] By transforming the laboratory space into a working social system of knowledge production, Latourian theory offers this chapter the design by which to observe human researchers, non-human animal research subjects, technologies, discourses and spaces within an interactive framework, concurrently separate from and connected to one another within this unique environment.

Latour's first contribution to the investigative focus of this chapter is in drawing attention to the significance of laboratorial activities that are *not* documented, alluding to the selectivity of scientific materials and outputs emitted from the empirical space. Latour's chief observation is that he is 'confronted with a strange tribe who spend the greatest part of their day coding, marking, altering, correcting, reading and writing'.[227] Latour considers the implications of these modal forms of knowledge production, noting that '[t]he construction of facts depends critically on these microprocesses'.[228] The human and non-human animal encounters engendered during the scientific process are completely dominated by the process: shaped, constructed, and determined by the experiment at hand where agencies and potentials of encounter are heavily scripted. Latour questions: '[w]hat then is the significance of those activities which are apparently not related to the marking, writing, coding and correcting?'.[229] This approach broadens our initial

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[224] Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts* (Princeton: Princeton University Press, 1986), p. 43.

[225] *Ibid.*, p. 29.

[226] *Ibid.*

[227] *Ibid*., p. 49.

[228] *Ibid.*, p. 41.

[229] *Ibid.*, p. 49.

overview of laboratory activities to include other forms of human and non-human animal encounters, not just those explicit to the empirical investigation at hand. It helps to identify a variety of potential interspecies interactions that are not so heavily influenced by the same empirical logics present during investigations. Latour's approach conversely implicates a more comprehensive picture of the laboratory space that can reconsider the broader experience and encounter between humans and non-human animals *outside* the laboratory's operational hours or allocated time of a study. Whilst data is recorded, Latour observes that '[i]n the meantime animals have been killed and various materials such as ether, cotton, pipettes, syringes, and tubes have been used'.[230] Latour reprioritises attention to *include* these other accompanying processes that are not documented in the scientific data or resultant literary outputs. These other activities will never exist outside of the laboratory space, as they are not the hypothetical or methodological phenomenon under investigation, simply the operational means by which reach a final empirical objective. Through his conceptualised approach, Latour offers a valuable reconsideration of laboratory activities to include *all* moments of interaction between humans and non-human animals *outside* the empirical process. The resultant implication is that literary fiction can rely on a similar approach, painting a comprehensive a picture of the laboratory space that encapsulates the entire non-human animal experience away from empirical logics specific to experimentation.

In order to effectively consider the potentialities of these *other activities*, it is reasonable to divide them into two sub-sections: those occurring *inside* and *outside* empirical processes of knowledge production involving non-human animal participation. Latour's approaches can be more effectively applied in relation to these different moments of human and non-human animal interaction and encounter. As will be demonstrated, fictional strategies can navigate around these empirical investigations in which scientific data and results are then produced, during which broader non-human animal existences are never acknowledged. Instead, literary fiction can reconstruct the experiences of non-human animals outside the duration of any laboratory research study; fragments of their true experience are only ever glimpsed at through scientific vernacular and literary outputs. Several scientific documents all concerning the same group of non-human animal subjects, though each pertaining to a different study, would not represent an effective impression of non-human animal life in the laboratory space. How then can fictional strategies paint a more comprehensive picture of non-human animal life in the laboratory space and consider the epistemological constructs that determine their existence there?

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[230] *Ibid*.

Empirical Cultures: Narrative Strategies of McAdam and Fowler

Mary Shelley's *Frankenstein*, Nathaniel Hawthorne's *The Birth-Mark*, and H. G. Wells' *The Island of Doctor Moreau* exhibit how canonical literature addresses the laboratory as both a physical and conceptual space, evidencing that visions of the laboratory as a reserved space are not new. These literary traditions of representing the laboratory will be briefly outlined in order to help frame the literary contributions of McAdam and Fowler; contemporary novels that are also interested in how the scientific laboratory constructs itself as hermetically sealed off and separate from the world. Historically, writers have represented the laboratory as a space to be visited but never fully comprehended, endowing their reconstructions with a sense of exclusivity and anthropological exoticism. Often, laboratory systems of autonomy are seen to become diluted upon intrusion by external bodies and result in dissolutions of power and scientific sovereignty.

Published in 1818, Shelley's *Frankenstein* paints the laboratory as a reserved space, away from the public domain and independent of the parameters of social conscience. Frankenstein's unconstrained passion eventually sees him withdraw from social interactions completely as his 'person had become emancipated with confinement'[231], his research having 'secluded [him] from the intercourse of my fellow-creatures, and rendered [him] unsocial'[232]. Philip Armstrong notes a sense of 'irresponsible isolationism and instrumentalism' through such endogenous methods of control.[233] Published in 1843, Hawthorne's *The Birth-Mark* features Alymer, who is vehemently seized by 'his strong and eager aspiration towards the infinite'.[234] Hawthorne's laboratory is portrayed as technologically exotic. Mary Rucker observes '[t]he laboratory, with its fiery furnace and soot, its machines […] its unadorned walls, is the realm of the intellect and the empirical'.[235] H. G. Wells' 1896 novel *The Island of Doctor Moreau* is especially interesting due to contextual influences. During the Victorian era, scientific empiricism was legitimized as a medium of

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[231] *Ibid.*, p. 33.

[232] *Ibid.*, p. 45.

[233] Philip Armstrong, *What Animals Mean*, p. 63.

[234] Nathaniel Hawthorne, 'The Birth-Mark', in *The Norton Anthology of American Literature*, ed. by Nina Baym and others, 7th edn (New York: W. W. Norton & Company, 2007), pp. 1320-1332 (p. 1328).

[235] Mary E. Rucker, 'Science and Art in Hawthorne's "The Birth-Mark"', *Nineteenth-Century Literature*, 41 (1987), 457-458 (p. 458).

knowledge creation. Wells' laboratory exists out on 'a small volcanic islet, and uninhabited […] out of human knowledge about latitude 5° S. and longitude 105° W.', ironically the geographical locale as the Galapagos archipelago and Darwin's work on the evolution of species.[236] The novel considers broader ethical and moral implications of scientific activities that necessitate the establishment of a space detached from the public realm and free from legislative constraints, noting '[i]t is when suffering finds a voice and sets our nerves quivering that this pity comes troubling us'.[237] These three texts highlight traditional thematic trends in literary depictions of the laboratory space to contrast with contemporary representations of the modern empirical setting, as well as the human and non-human animal encounters engendered there. Crucially, they prompt a consideration as to whether contemporary literary representations of the modern laboratory in Fowler and McAdam's novels depend on the same *kinds* of strategic literary approaches to instigate the same notions of exposure, critique, and moral revelation.

McAdam's *A Beautiful Truth* and Fowler's *We Are All Completely Beside Ourselves* employ two different narrative strategies to facilitate an exploration of the laboratory space. A preliminary comparison of these approaches is beneficial to consider how contemporary literary fiction can employ different stratagems to help understand human and non-human animal interactions engendered there. Regarding McAdam's narrative strategy, McKay offers the summary: 'McAdam weaves together an enormous cast of human and nonhuman characters, perspectives and locations in order to tell the story of Looee […] [t]he novel is told from first, second and third person perspectives, from the points of view of different – sometimes multiple – characters, and in present, past and occasionally future tenses'.[238] She goes on to deem McAdam's stylistic approach as a 'risky narrative style, where the author is attempting to present multiple sides of the story […] enabling a broad reading of human/nonhuman animal relationships'.[239] Though McKay is predominantly concerned with the territorialisation and interplay of interspecies exchange within the domestic setting, this synopsis of McAdam's narrative strategy becomes all the more interesting when considered within the laboratory space. The laboratory featured in McAdam's novel is inhabited by a troop of chimpanzees, each transplanted from various biomedical backgrounds into the present cognitive behavioural study

[236] H. G. Wells, *The Island of Doctor Moreau* (Penguin Random House, 2016), pp. 1-2.

[237] *Ibid.*, p. 36.

[238] McKay, p. 237.

[239] *Ibid.*

featured in the novel. For McKay, the dangers of McAdam's narrative emanate from his endeavouring to depict 'the voices and interiority of human and nonhuman characters'.[240] Certainly, McAdam goes to great lengths to endow the primate-led narratives in the novel with a combination of syntax and diction, delivered always with an element of visceral impulsivity, designed to encourage readers to identify a unique chimpanzee identity and sensibility. The chimpanzees are oblivious to being subjects of scientific investigation and it is only through Mr Ghoul's recollections that readers learn of past experiments that are now omitted from their daily routine.

McAdam's David Kennedy is lead cognitive ethologist of the Girdish Institute and is the only specifically scientific character in the novel; a narrative strategy that permits McAdam to present the viewpoint of the investigator within the laboratory space. David's narrative is a collage of recollections and observations taken from both the past and immediate present, the totality of which offer a view of primate research history and chronological approaches to investigative methods that accommodate various scientific episteme. Whilst sympathetic toward the chimpanzees and their incarcerated situation, McAdam's narrative strategy nevertheless places David as a proponent of the laboratory; an active instigator of scientific investigative practices. David genuinely believes in the legitimacy of laboratory-based study, as he 'used to envy the people doing the field studies […] but he also had plenty of his own stories, his own examples of culture and of inventiveness'.[241] Intriguingly, there are moments of contradiction within his contemplations, for example when he considers '[t]hat there were experiments that made him feel he was part of a family', paradoxically implicating a dual sense of familial relationship and genealogical inheritance resultant from an artificially constructed proximity.[242]

David's early-career memories are 'not just of youthful enthusiasm but of iconoclasm […] he wanted to demolish beliefs about what it meant to be human', the pursuit of which paradoxically finds him joining the anthropocentric constructivism of the empirical sciences at the expense of non-human animal freedom.[243] Most significantly, David proposes that '[w]herever

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[240] *Ibid*.

[241] Colin McAdam, *A Beautiful Truth* (London: Granta Publications, 2013), p. 64.

[242] *Ibid.*, p. 65.

[243] *Ibid.*

they are, apes invent culture, and their culture is strengthened through the exclusion of others'.[244] This reverberates with Latour's sociographical approach of the laboratory space and that science is a predominantly socially constructed sub-culture of human civilisation. McAdam's mention reiterates this notion of the empirical sciences having its own dialect, customs, and ideological principles that actively look to exclude other cultures or species in order to operate. McAdam describes that 'every ape, humans included, [are] always adapting to some sort of culture imposed by others', not only applicable to David's own situation but also a reverberation of Haraway's theoretical approach that considers knowledges produced within the laboratory space can be influence and even inhibited by the dominant culture that determines the situational circumstance of non-human animals.[245] The implication here is that David is always an insider, a denizen of the laboratory space and his considerations, though compassionate, are nonetheless always influenced by the epistemological processes and practices of scientific investigation; thus they are wholly subjective.

Conversely, Fowler has no character within the laboratory space in *We Are All Completely Beside Ourselves*. The events of the novel are chronologically muddled, an implied deliberate tactic by the narrator Rose, who is always acutely aware of the limitations of linguistic ability; her maxim being '[w]hen you think of two things to say, pick your favourite and only say that'.[246] This seems to be an initial admission of limitation, but is actually a narrative strategy by Fowler to liberate Rose, who is now 'aware that her narrative will be structurally incapable of doing full justice to her complex relations with Fern'.[247] Reminiscent of more traditional thematics in Shelley, Hawthorne and Wells, Fowler's laboratory remains a remote space that Rose's narrative never offers full access to, an unvisited yet prominent presence on the periphery of events throughout the novel. Indeed, Rose's unscientific background ensures that the laboratory space retains a sense of anthropological distance and exoticism throughout. Alternatively however, Rose's brother Lowell provides a guest narrative that offers some perspective of the laboratory space, a by-product of his activism with the Animal Liberation Front (ALF).

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[244] *Ibid*.

[245] *Ibid.*, p. 64.

[246] Fowler, *We Are All Completely Beside Ourselves*, p. ii.

[247] Calarco, 'Boundary Issues', p. 626.

Lowell's intermittent narrative represents a significant strategy by Fowler to reinterpret traditional thematics of the dilution of scientific autonomy via the intrusion of foreign bodies to accommodate modern activist methods of exposure, revelation, and liberation concerning the use and exploitation of non-human animals in the laboratory. Never following Lowell into the laboratory space, the narrative relies on Lowell's extraction and recollection of evidence to elaborate on Fern's circumstance, as 'ALF tactics included animal rescue and release, and also the theft of notebooks and lab records. They took photographs of vivisections for release to the press'.[248] Though never entirely condoned in the novel, Lowell's activism is the primary tool by which an evaluation of Fern's incarceration is obtained.[249] Otherwise, there is no "whitecoat" character inside Fowler's fictional laboratory. Rose's father is a cognitive behavioural scientist, but he is portrayed as inhabiting a separate hybridised space with its methodological roots in the laboratory operating under self-direction in the domestic setting, now shunned by the wider scientific community following the collapse of his co-habitation research project. Instead, Fowler punctuates her novel with real-life accounts of the experiences of primates, both in cognitive behavioural language studies and later biomedical experiments, going on to fictionally transplant Rose's narrative into the historiographical framework of these actual anthologies. Fern's experiences within the laboratory space are thus perceived from the outside looking in, by those whose definition of the human-non-human animal relationship are distorted and weighed heavily with sentiment.

These novelistic strategies clearly demonstrate two entirely different literary approaches in terms of reconsidering the human and non-human animal encounters within the modern laboratory space. Fowler's narrative strategy to present fictional narrative and scientific contextual resources side-by-side results in a greater sense of distance; the laboratory is always separate from the core events of the narrative. Through this approach, not only does Fowler promote a more traditional version of the laboratory space existent on the peripheral of the social world, but also encourages a reflection of the potential for *other* encounters being omitted from scientific documentation; the only outputs emerging from these spaces are informative of non-human animal life there. Conversely, McAdam's narrative strategy could initially threaten to negate the same kinds of objective exploration or reconsideration of the laboratory space as one key narrative is narrated by an insider. However, despite his scientific leanings, David instinctively

[248] Fowler, *We Are All Completely Beside Ourselves*, p. 140.

[249] Calarco, 'Boundary Issues', p. 631.

offers a view of the more intimate interspecies encounters occurring at specific points during the scientific process, through which McAdam can explore affective ramifications of those moments.

Moments *Outside* the Process: Personal History and Memory

Throughout *A Beautiful Truth*, David's narrative is full of contradictions that belie both a sense of loyalty to the methodologies of science and an understanding of its limitations, demonstrated in the continued indulgence in his visceral responses to the circumstances of the chimpanzees. David admits that '[w]e never had the choice of chimps that I wanted […] I had an ideal subject in mind […] [o]ur chimps came from everywhere, and it soon appealed to me as a city in a microcosm'.[250] The use of plural possessive pronouns blatantly sees him identify with the scientific establishment and his conceding to the artificial creation of a social group of chimpanzees: transplanted individuals whose memberships are determined by human constructs of availability and cost. Intriguingly, McAdam has David muse that '[o]f course backgrounds and personal histories mattered, but […] those personal histories would have to come up against the reality of this new society'.[251] In essence, this summarises the key narrative strategies featured in both McAdam's and Fowler's novels; the personal histories of Looee and Fern are contrasted against their situational circumstance following admittance into the laboratory space. Both authors offer a reconsideration of the potential value in moments occurring *outside* the empirical process to better deliberate non-human animal experience and the epistemological constructs that put them there by evaluating what is changed or even lost during transition.

These narrative strategies are inherently linked with notions of temporality and literary meaning, instances of which will be exhibited throughout this section. As highlighted, McAdam and Fowler deliberately force a comparison of Looee's and Fern's experience in the laboratory against their prior domestic upbringings to consider whether their situations are morally outrageous because they were raised as human or because it is the situation of all non-human animals in the laboratory space. Both authors construct a sense of character history, thus placing their time in the laboratory within the chronology of non-human animal lives and expanding their existence beyond their inclusion in scientific experimentation. This is achieved via narrative

[250] McAdam, p. 66.

[251] *Ibid.*

strategies of temporality in the form of memories and recollections that broaden considerations of the non-human animal experience, against which the affective impact of their incarceration into the laboratory space can be more effectively contrasted and evaluated.

Firstly, specific fictional strategies invert the way in which a non-human animal exists within the parameters and duration of a study. McAdam writes: 'David has had the courage to touch his hands through the bars. He sensed that Looee is comfortable with people and surmises that he spent time in a human environment. His records have long been lost'.[252] McAdam renegotiates the confines of linear temporality to consider that the non-human animal under experimentation has existed and will exist beyond the parameters of a research study, during which their past is obsolete and current existence determined by usefulness. McAdam summarizes empirical processes, outlined in the space of a short paragraph:

> [David] has his stopwatch and timesheet, and it is all being recorded. He will have to describe it in the language of his trade and the data will have to be mapped. With his colleagues he will talk about side interventions, new coalitions, eye contact and posterior grooming. His assistants will help him put a paper together.[253]

McAdam's succinct summary highlights all major stages, namely observation, recording, writing and eventually publication, decidedly reminiscent of Latour's own key activities. Latour notes these processes are signposts of what he determines to be 'the retrospective characterisation of scientific activity'.[254] In David's investigation, certain chimpanzee behaviours are prioritized over others and filtered out from a mosaic of behavioural and social activities to be later relayed and translated into the scientific vernacular. Echoing Latour's principle observation that '[t]he production of papers is acknowledged by [human] participants as the main objective of their activity', David's narrative is made more poignant for what it both includes and insinuates to ignore.[255] David's scientific role is therefore invaluable, as his narrative reveals the scientific reliance on methods and devices of temporal control, shown through his use of a stopwatches and timesheets, to allocate specific periods of time for information extraction and knowledge

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[252] *Ibid.*, p. 244.

[253] *Ibid.*, p. 265.

[254] Latour and Woolgar, *Laboratory Life*, p. 41.

[255] *Ibid.*, p. 71.

production. Conversely, David's narrative throughout *A Beautiful Truth* never indulges in the calculating specifics of empirical investigation, relying on his personal experiences and encounters to rationalise his attitude toward the chimpanzees. Any apparatus or features of the cognition studies that do appear are glimpsed at through the narratives of the chimpanzees, and therefore their empirical significance is never fully recognised or acknowledged. Instead, McAdam's inclusion of empirical processes works to acknowledge but ultimately refocus attentions beyond the specifics of empirical design with the intention of exploring the ways in which non-human animal life exists beyond it.

Within the laboratory, McAdam expands manipulations of temporality through the inclusion of memories and personal recollections to instigate considerations on non-human animal experience; multiple narratives of the novel are held against one another to elicit valuable deliberations on memory. These are presented and then held in comparison to Looee's immediate situation within the epistemological logics of the laboratory space. For example, laboratory practices dictate that David and his staff 'no longer introduce the apes by name […] [as] names don't exist in the wild',[256] and yet Looee himself 'sometimes wonders whom people are calling. He remembers Looee, who lived in a house'.[257] Ironically purporting to emulate wild conditions within the artificiality of the laboratory setting, Looee's quotidian experience is determined by these scientific procedures and missing records; his past history lost with them. When the histories of Looee and the Girdish Institute intertwine, it is Looee who loses the identity that McAdam's narrative has worked to establish thus far. During their brief interaction, Looee's past is acknowledged by David but ultimately ignored, as the model of knowledge produced from him will always omit unimportant details; determined to be so under the principles of scientific empiricism. Looee's past history maintains he is something more complex and far richer than the empirical processes and resultant materials would represent him as. By exploring the potential of memory to broaden considerations of the non-human animal experience, McAdam reconsiders the traumatic experience of incarceration into the laboratory setting by proposing that non-human animals are not the idealised vacuous models for scientific experimentation.

Fowler also examines the potentialities in moments outside of empirical processes, including the same notions of loss of identity upon admission to the laboratory space. However,

[256] McAdam, p. 244.

[257] *Ibid.*, p. 245.

as there is no non-human animal narrative, Fowler achieves this by exploring specific systems of acquisition and regulation that reduce the non-human animal to scientific materials. This reconfiguration sees Fern, a chimpanzee with all the properties and emotional accompaniment of a human infant, placed within the scientific structure that denies her past identity and determines her future based on human conceptual constructs, such as 'closing a budgetary gap'.[258] Like McAdam, Fowler contrasts Fern's domestic upbringing to weigh against her commodification upon entry to the laboratory, reemphasizing the various legislative policies available to the scientific community regarding non-human animals. Fowler writes:

> There was something NotSame about Fern and me, something so outrageous that Lowell hadn't even suspected it until he went to South Dakota […] Like a chair or a car or a television, Fern could be bought and sold. The whole time she was living in the farmhouse with us as a part of our family, the whole time she was keeping herself busy being our sister and daughter, she was, in fact, the property of Indiana University.[259]

Fern and Looe are non-human animals, or *other*, and so are therefore subject to commodification. Certainly, Roger Fouts recalls the moment Nim was sold into biomedical experimentation, learning 'that [Dr. William] Lemmon was selling his entire chimpanzee colony, including Nim, to the Laboratory for Experimental Medicine and Surgery in Primates (LEMSIP) in New York […] owned by New York University'.[260] Like Looee, Fern's past, present and future is now predetermined by a contractual arrangement that sees her move from family member to biological material that is property of the scientific institution. Though considering the initial reasons for Fern's arrival, Fowler is careful to continually emphasize that she was the subject of an empirical investigation always present behind the façade of familial domesticity.

Like McAdam, Fowler negotiates issues of temporality pertaining to notions of memory through narrative strategy, however she accentuates elements of its unreliability in order to better consider its affective potential. Whilst Rose's childhood memories of Fern encapsulate moments within and without her father's temporally allocated experimentation periods, readers

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[258] Fowler, *We Are All Completely Beside* Ourselves, p. 215.

[259] *Ibid.*, p. 213.

[260] Fouts, p. 273.

never have to determine its success but are instead encouraged to consider the broader experience and implications of living in close proximity with a chimpanzee. Certainly, Rose's memories help to contextualise her father's work and elaborate on Fern's situation, as she considers: '[w]as my father kind to animals? I thought so as a child, but I knew less about the lives of lab rats then […] my father was kind to animals unless it was in the interest of science to be otherwise'.[261] Crucially, Rose's plethora of memories ultimately implicate the existence of *shared* memories. Fowler's implied existence of these shared memories enhances the traumatic potential of Fern's eventual incarceration; her commodification confirmed upon admittance into the laboratory space.

Fern's identity becomes blurred during the transitional phase from outside to inside the epistemological logics of the laboratory setting; her future is determined by the fact that she was 'an expensive proposition' and the institution had 'no place to house her'.[262] As Rose and Fern's cohabitation occurs during infancy, events are translated through a lens of childish innocence and subjected to the hazing of memory over time. Rose never suggests that time is detrimental to her recollections, but rather fuels her present inner conflict to reflect the complexity and multifaceted nature of her relationship with Fern; stressed through Fowler's deliberately disjointed narrative. Fowler realises the potential of memory to present reconsiderations of the non-human animal experience, and the temporal complexities of memory are utilised throughout. Indeed, Rose even admits that the inciting moment of the novel, an act of severe violence and maliciousness by Fern, is a memory 'only as vivid to me as the one it replaces'.[263] Only the specific aesthetic details of the memory are gone whilst its affective resonances remain. Such recollective instances amalgamate to create an unsystematic collage of interspecies encounters over a total of five years; the end of which sees Fern removed and redefined as *other* upon her incarceration into the laboratory.

Fowler includes another reverse form of temporality in *We Are All Completely Beside Ourselves*, through a comparison of Rose and Fern's upbringings even before or *outside* the cohabitation study. Fowler expands considerations of Fern to include her species point of origin and what would be natural habitat in a time before Rose and the laboratory. Fowler broadens our consideration through literary modes of temporal negotiation, as Rose notes: 'I was born in a

[261] Fowler, *We Are All Completely Beside Ourselves*, p. 92.

[262] *Ibid.*, p. 213.

[263] *Ibid.*, p. 248.

hospital in Bloomington, an unremarkable delivery. Fern was born in Africa, where, barely a month later, her mother was killed and sold as food'.[264] The part of the novel uncomfortably reiterates Fern's classification as *other* and that her entire association with Rose and her family is completely artificial by nature, though she never implies Rose's affected response is disingenuous. Nevertheless, this cue prompts a total reconsideration of both the sincerity and ethical foundation of events in the novel, placing Rose's narrative under scrutiny as the derivative of human insistence upon non-human animals for knowledge production. Evidence of Fern's origin comes to the fore during Rose's recollection of a college lecture on chimpanzee 'propensity for insider/outsider violence'.[265] By this point in the novel, this information is so far removed from what a reader has experienced of Fern, wholly indistinguishable from Rose in her emotive upbringing, that her point of origin seems now permanently estranged. This is further accentuated by Fowler's narrative strategy to reveal Fern is a chimpanzee almost a third of the way through the novel itself. Fowler has Rose proposition that this is so the reader could 'see it how it really was […] thinking of her as my sister'[266], conceding Fern was 'the only sister I ever had […] an experiment with no control'.[267] Fowler's approach thus holds together the two narratives of Fern's incarceration in the laboratory and her cohabitation with Rose to instigate a comparison of empirical treatments of non-human animals, yet both occur simultaneously within the broader narrative of her having been captured and transplanted out of her natural point of origin.

The Laboratory: A Physical and Conceptualised Space

The chapter will now examine how literary fictional strategies can prompt further considerations of the laboratory as both a conceptualised and physical space through negotiations of temporality and contextualisation, and the broader implications these have on the experience of the non-human animal within it. Beginning with the conceptualised laboratory, it is beneficial to briefly outline the inherent epistemological features of empirical processes to better understand it as a mode of knowledge creation. Universally, systems of knowledge production within the laboratory space are strictly confined to scientific methodological processes and the systems of linear

[264] *Ibid.*, p. 285.

[265] *Ibid.*, p. 148.

[266] *Ibid.*, p. 77.

[267] *Ibid.*, p. 79.

temporality that these subsequently implicate. More simply, the successful production of knowledge depends on the extraction of data over time from sequential events during their chronological progression until a predetermined endpoint that satisfies a working hypothesis. Crucially, a major advantage of literary strategy lies in broader contextualisation: the ability to place these current methodologies within a wider historiography of science that perceives currently active empirical paradigms as part of a larger developmental process, or simply one active investigative trend at the end of a sequence of now expired methodologies. Resultantly, this allows for a more comprehensive consideration of the laboratory space, particularly as it places non-human animals within a broader historiography of scientific use of non-human animal subjects. The fundamental implication is that these current paradigms, and their use of non-human animal subjects, can be perceived as one particular epistemological trend and ultimately temporary. This prompts further considerations as to the focus of current empirical methodologies to deliberate what is conversely being overlooked and how the non-human animal experience changes during these epistemological shifts. Using McAdam's character David, whose narrative setting is the laboratory space, the chapter will now examine how narrative strategies offer a comprehensive view of the laboratory as a conceptualised space by renegotiating inherent issues of linear temporality.

David's narrative throughout *A Beautiful Truth* allows McAdam to paint a retrospective of his literary laboratory in a way that foregrounds the broader epistemological landscape of laboratory non-human animal science as something forever shifting. McAdam writes:

> [The Girdish Institute] was a warren of different interests in those days and when he thinks of it he remembers a time of great excitement […] Staff would smoke pipes and pot and sit with younger apes, and ideas were openly traded […] David was young then, as was his profession. And when you're young it sometimes seems like the world, no matter how old, is being shaped anew. It seemed like everyone was talking about primates. Journalists often visited, and some of the research was published in the popular press around the world […] it seemed like humans were at least talking about kinship, if not actually acknowledging that they were apes.[268]

[268] McAdam, pp. 63-64.

Though rather rose-tinted, David's recollection is of an emergent profession that used to encourage physical integration and mutual learning during a form of interspecies exchange. Again, David's belief in the sovereignty of science threatens bias, but this sense of freedom was true of laboratories even as late as the 1980s. Researchers investigating primate cognitive development and language acquisition at Yerkes noted the routine of Kanzi, a young second-generation captive-born male chimpanzee, reporting that he 'strongly bonded to the human companions who had been with him and his mother daily […] [o]ne or more of these caretakers was with Kanzi daily, 24 hours a day, seven days a week, and he was never caged'.[269] Fifteen years on, the same institution records the extinction of such interactions, encouraged by new innovative technologies and redeterminations of scientific empiricism. In 2000, Lana, a 27-year-old captive-born female chimpanzee taught to use a 'visuographic language system as an infant', is recorded to have participated in an enumeration task involving a 'computer and monitor […] on a mobile cart that that was moved into the chimpanzees' home area for test sessions […] attached to the chimpanzees' home cage through a portal on the face of the cage'.[270] The interspecies interactions have disappeared, as changes are made to accommodate new epistemological shifts in scientific conceptions of the laboratory and how its methodologies should operate.

These instances evidence the ever-changing complexion of the laboratory; an environment forever being readapted to accommodate various scientific episteme, reorganisations and renovations of staff, apparatus, equipment, and non-human animal subjects in order to accommodate new hypotheses and ideological criteria. To accentuate this same conceptual subjection, McAdam's narrative strategy condenses the history of the laboratory, signified by the Girdish Institute, into a manageable historical timeframe though anecdotal recollection in order to suggest the space has witnessed the same ideological shifts determined by dominant scientific paradigms. More broadly, this implies that these methodological barriers are *created*, that there was a time *before* the permanent separation of investigator and subject. When coupled with Mr Ghoul's narrative, readers can consider what is now missing from present human and non-human

[269] Sue Savage-Rumbaugh, Duane Rumbaugh and Kelly McDonald, 'Language Learning in Two Species of Apes', *Neuroscience & Biobehavioural Reviews*, 9 (1985), 653-665 (p. 655).

[270] Michael Beran and Duane Rumbaugh, '"Constructive" enumeration by chimpanzees (Pan troglodytes) on a computerized task', *Animal Cognition*, 4 (2001), 81-89 (p. 83).

encounters, allowing a more comprehensive picture of the laboratory's own historiography and history of interaction.

The non-linear temporalities of literature can reconsider conceptualisations of the laboratory as permanently fixed or a purpose-built space designed specifically for one investigation. McAdam writes, '[c]oncrete cannot bury memories but it makes them harder to envision. It is only when he wills his recollections that he can picture what these spaces once were'.[271] Literary representations of the laboratory become domains charged with a history that resonates throughout the architecture and establish a sense of consequence undetectable in laboratory result sheets and data outputs concerned only with satisfying current paradigms. During *A Beautiful Truth*, McAdam confirms the year the Girdish institution was founded, potently similar to that of the Yerkes laboratories: 'a large primate research facility that had started in the 1920s. They bred their own animals and acquired them from wherever they could'.[272] McAdam has the Girdish Institute benefit from 'a historic relationship with primates and a facility that occupies a hundred acres', implying that the terms of this relationship have changed over time. Moreover, McAdam reconsiders the multi-purpose nature of laboratory spaces, reemphasizing the selectivity of scientific investigations and the materials produced within it. For example, David recollects that '[f]rom room to room there were studies of intelligence, memory, communication, breeding, all distinct and diverse but united by a sense that we were always on the verge of something' during the early days of the Girdish Institute.[273] Halfway through the novel McAdam includes a mention of biomedical testing at David's own facility: 'biomedical experiments, research done for the benefit of all species'.[274] The revelation that David's primate behavioural study shares the same walls as biomedical experimentations causes his laboratory to change into something else entirely, endowed with a far more sinister dual history.

[271] McAdam, p. 122.

[272] *Ibid.*, p. 149.

[273] *Ibid.*, p. 63.

[274] *Ibid.*, p. 149.

Physical Laboratories: Contextualisation and the Politics of Sight

The moral and ethical complexities of modern laboratory-based experimentation using non-human animals, particularly those of the biomedical nature, necessitate an element of social invisibility in terms of the physical laboratory space. Any deliberation of fictional representations of the physical appearances of the laboratory would therefore benefit from a consideration of the conceptual approaches of Timothy Pachirat, a reflection of veiled spaces and uses of the non-human animal, in *Every Twelve Seconds: Industrialized Slaughter and the Politics of Sight*. Under the term 'politics of sight', Pachirat offers a 'reflection on how distance and concealment operate as mechanisms of power in modern society'.[275] These ideas are intrinsic to concepts of scientific autonomy, an empirical space reserved and protected by its own physical, ideological and legislative boundaries, diluted and compromised upon intrusion from the outside. Whilst Pachirat's case study is the industrialized slaughter of cattle in a slaughterhouse in Omaha, he also considers the implications of establishing a 'morally sterile' and 'socially invisible' environment, dividing considerations into four metrics: physical, social, linguistic and methodological.[276] Like Latour, Pachirat offers a sociological perspective of a space 'considered morally and physically repellent by the vast majority […] [but] sequestered from view rather than eliminated or transformed'.[277] During his considerations of the binaries of visibility and invisibility, including their role in attempting to establish autonomy and control, Pachirat observes how nothing prepared him for 'the utter invisibility […] [and] banal insidiousness of what hides in plain sight', and how the facility 'blends seamlessly into the landscape of generic business parks ubiquitous to Everyplace, U.S.A.'.[278] Pachirat's approach offers a number of valuable considerations applicable to the laboratory space, as he highlights how institutionalised spaces rely on an existence 'out of sight and consciousness […] shut away behind impenetrable walls of jargon and concrete'.[279] Crucially, Pachirat's reflections highlight a conceptual opposition within laboratory-based science using non-human animals, claiming total visibility in the extraction of universal truths to create knowledge whilst employing operational modes that install strategies of *invisibility*. Usefully,

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[275] Timothy Pachirat, *Every Twelve Seconds: Industrialized Slaughter and the Politics of Sight* (London: Yale University Press, 2011), p. 3.

[276] *Ibid.*

[277] *Ibid.*, p. 11.

[278] *Ibid.*, p. 23.

[279] *Ibid.*, p. 241.

these theoretical approaches can be used constructively to then consider how fictional reconstructions of the laboratory space acknowledge these same approaches of invisibility and visibility to maintain its autonomy and control, whilst still offering an effective reconsideration of the non-human animal experience.

Pachirat's work on the politics of sight is heavily influenced by Foucault's work on the same applications of visibility and invisibility underlying processes of power installed across a variety of institutional settings.[280] Foucauldian approaches offer valuable considerations of the laboratory space through their reflections of conceptualisations of the penal system. Foucault offers a reconsideration of the prison as a conceptualised space as developed throughout the seventeenth and eighteenth centuries. In drawing from Foucault's work, it is not to determine whether human prisoners and non-human animal research subjects are to be considered legal equivalents, but rather to compare the evolution of two systems of the institutionalised space. Several similarities can be drawn between the prison and laboratory, not least as both research subjects and inmates are incarcerated without 'knowledge either of the charges or of the evidence […] knowledge was the absolute privilege of the prosecution'.[281] Foucauldian theory would propose that both the laboratory and prison settings evolved through a combination of immediate circumstance and developmental momentum, an element of learning "on the job". Foucault intriguingly likens early manifestations of the prison space to a laboratory, as 'it could be used as a machine to carry out experiments, to alter behaviour, to train or correct individuals. To experiment with medicines and monitor their effects […] [t]o teach different techniques simultaneously to the workers, to decide which is best'.[282] The cognitive behavioural and biomedical researches of the 1970s and 1980s had no centralised practice concerning the use of primates, and Rumbaugh still defended primatological research at Yerkes in 1981, entreating critics to remember 'that the field of ape-language research is very young […] [with] faults inherent in all human endeavours including those of science'.[283]

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[280] *Ibid.*, p. 12.

[281] Michel Foucault, *Discipline and Punish: The Birth of the Prison* (London: Penguin Books Ltd, 1991), p. 35.

[282] *Ibid.*, pp. 203-204.

[283] Duane Rumbaugh, 'Who Feeds Clever Hans?', *Annals of the New York Academy of Sciences*, 364 (June, 1981), 26-34 (p. 30).

Elizabeth Hess notes the appearance of modern laboratories, particularly the appearance of the Laboratory for Experimental Medicine and Surgery in Primates (LEMSIP). She writes that 'LEMSIP, along with its inmates, was all but invisible to the outside world […] From the outside, the place looked more like an unadorned corporate headquarters than a prison for primates […] the bland exterior belied its grim interior'.[284] Deborah Blum echoes Hess' point that '[t]here is nothing fortress-like about LEMSIP – no barbed wire, no alarms, just a rambling complex of wood and concrete-block buildings'.[285] The invisibility of the physical laboratory presents a challenge to literary representations, though both McAdam and Fowler use narrative strategies that encourage transparency of a physical building whose presence may otherwise go entirely unnoticed. Unlike McAdam, Fowler utilises her narrative's external viewpoint to instigate considerations of the laboratory as a physical space and its localization within a landscape. Fowler's description of her fictional laboratory is unnervingly familiar, having 'a country road address […] six miles out of town' and described simply as 'a compound with a chain-link fence', though it is 'threaded with the telltale electrical wire'.[286] Contrastingly to Hess' description of LEMSIP, Fowler indicates subtle elements of ambiguous fortification: features that would typically betray the existence of an institutionalised space. Through hiding her literary laboratory in plain view, Fowler looks to offer a modern reinterpretation of the laboratory as a veiled space, a key thematic in the traditional literary laboratories of Shelley, Hawthorne and Wells. Fowler endows the laboratory with a sense of architectural history, a system of temporal control that implicates a past or point of origin against which to consider its current existence.

Access to the laboratory space is provided by Rose's brother Lowell, whose first venture into the laboratory space to seek out Fern is achieved relatively simply, as 'he crossed the road and slipped through the door into the main building'.[287] The nondescript external appearance of the laboratory is then set against Lowell's sensory experience of it, noting 'a strong odour in the stairwell, a mix of ammonia and shit […] [i]t was bright enough to see four cages, all in a row, and at least a dozen dark, squat figures inside them'.[288] Fowler's narrative strategy offers Lowell's own visceral reaction to entering the laboratory setting, forcing a contrast to how we have experienced

[284] Elizabeth Hess, *Nim Chimpsky: The Chimp Who Would Be Human* (New York: Bantam Dell, 2009), p. 258.

[285] Deborah Blum, *The Monkey Wars* (Oxford: Oxford University Press, 1994), p. 168.

[286] Fowler, *We Are All Completely Beside Ourselves*, p. 205.

[287] *Ibid*.

[288] *Ibid,* p. 206.

Fern in the familial domestic setting. Fern's own behaviour during this passage accentuates the foreign characteristics of the space and its negative influences, as Lowell considers her volatile behaviour to be 'the first time in my life I'd ever been frightened of her'.[289] The sensory experience of Lowell animates a building which otherwise remains inanimate and exalts systems of control and sterilization, as Fowler's narrative fills it with 'screaming, coming from all the cages, echoing off the walls of the concrete'.[290] This sequence invites the reader to contemplate the multi-sensorial experience of entering such a space, as well as the affective potential in the sights, sounds, and smells inhabited there; synonymous with the non-human animal that omit them. After his initial encounter, Lowell is forced to rely on updates on Fern from another source *within* the institution as the laboratory autonomy is restored and parameters reset. Whilst Fowler paints Lowell in such a way that never openly condones his intrusive activities, the psychological ramifications of trying to visit and then visiting such a potentially affective space over time are accentuated; as Rose notes 'he'd struck me as crazy […] maybe *crazy* isn't quite the right word […] [m]aybe *traumatized* is better'.[291]

Fowler's narrative strategy then renegotiates restrictions of linear temporality to condense Fern's experiences in the laboratory across a period of over ten years. Parry aptly summarizes Fowler's literary strategy, noting 'the text's disorderly temporality, its elisions […] and Fern's multifaceted absence, create a fragmented and incomplete story'.[292] Through both Lowell's narrative and the inclusions of intertexts throughout the novel, the reader learns that these experiences include electrocution, sedation, and insemination for over a decade. All the while Fern's human upbringing remains visible, fragments of her past and cohabitation evidenced through attempted use of sign language on researchers and laboratory staff. This strategy enforces perceptions of the inaccessible laboratory, a physical space built specifically to close out external factions that would threaten exposure and its self-government. Undeniably, the futility of Lowell's efforts to liberate Fern over such a period of time reemphasizes the autonomous features of the modern laboratory space; physically veiled by mechanisms of distance and concealment and further safeguarded by appropriated legislations that preserve its sovereignty, criminalizing any external bodies who attempt to gain entry. Significantly, the consequence of

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[289] *Ibid.*, p. 207.

[290] *Ibid.*

[291] *Ibid.*, p. 227.

[292] Parry, p. 211.

Lowell's intrusion is the loss of his own freedom; criminalised for his unauthorized access by the legislature that protects the laboratory and forbids visual, audio, and documentations obtained in that space. Pachirat observes that these episodes of intrusion and exposure are perceived as highly conceptually dangerous as they 'threaten to surface power relations that work precisely through confinement, segregation, and invisibility'.[293] The autonomy of the laboratory forbids the extraction of knowledge *not* gathered by empirical means. Eventually, Fowler's narrative discovers Lowell incarcerated himself, after working 'for decades as a spy in the factory farms, the cosmetic and pharmaceutical labs. He's seen things we refuse to see […] sacrificed his family, his future, and now his freedom […] the direct result of his very best qualities, of our very best qualities'.[294]

Moments Missed *Inside* the Process

The chapter will now look to consider the value in human and non-human animal encounters missed *inside* or *during* the processes of knowledge production in the laboratory space; Latour's activities of 'coding, marking, altering, correcting, reading and writing'.[295] During processes of investigation, scientific methods of temporal control are at their most regimented; the ideal is to eliminate all external variables, once again including issues of temporality. The temporal logics within the laboratory are wholly artificial, as research schedules are regulated week-by-week, day-by-day and hour-by-hour, most likely accommodating the working routine of scientists, laboratory technicians and other research staff. Specific periods of time are allocated to pursuing identified hypotheses through empirical methodologies prioritised by current research trends. Experimentations on non-human animal life within these controlled periods of time are regarded as advantageous by advocates of laboratory study, especially over the longitudinal observations of field studies where a greater autonomy lies with the non-human animal subjects. Any discussions of these processes and the human and non-human animal encounters that occur within them will once again benefit from a consideration of Latourian theoretical approaches, deconstructing the mechanics of laboratory empirical investigation to

[293] Pachirat, p. 5.

[294] *Ibid.*, p. 307.

[295] Latour and Woolgar, *Laboratory Life*, p. 49.

identify key conceptual oppositions. Instigating an examination of the strategic abilities of literary fiction to consider the non-human animal experience during these investigative moments.

Firstly, Latour cautions against 'the perception that a fact is something which is simply recorded in an article and that it has neither been socially constructed nor possesses its own history of construction'.[296] This history of construction must not only consider predetermined parameters of a specific study and immediate influences of temporality, but it's historical development. Foucault's *The Order of Things* is a philosophical endeavour to map out the origins of the human sciences and can be helpful in supplementing Latour's considerations. An influential presence in Latour's own works, Foucault proposes that the human sciences are subtly influenced by three fundamental modes of knowledge: biology, economics and linguistics. He suggests these modes of knowledge have influenced certain scientific *episteme*, periods in history that mark shifts in the scientific consciousness and goes on to claim that *a priori* assumptions have occurred and still occur during these epistemological movements. These moments in human scientific history, or *episteme*, are therefore essentially compromised as the epistemological foundation of subsequent discourses are inescapably linked to the conditions of their possibility within a particular epoch. Similarly to Haraway, Foucault maintains the empirical sciences are a social construct, prone to the same imperceptible social and cultural influences as any other. Foucauldian theory can help to elaborate on Latour's approaches in such a way that instils a sense of constructive scepticism concerning the scientific dogma of empirical objectivity.

Issues of Language: Coding, Marking, Altering, Correcting, Reading and Writing

A Beautiful Truth and *We Are All Completely Beside Ourselves* both employ the same kind of constructive scepticism regarding Latour's core activities of scientific empiricism, especially considering they are all reliant on the constructs of human language, and the translational limitations of which Foucault heavily criticises.[297] When utilised in investigations of the non-human animal, empirical observations are transcribed into the scientific vernacular for documentation to establish a model of knowledge pertaining to that species' behaviour. Foucault

[296] *Ibid.*, p. 105.

[297] An extensive overview of Foucault's considerations of non-human animals is provided in *Foucault and Animals*, ed. by Matthew Chrulew, and Dinesh Joseph Wadiwel, (Leiden: Brill, 2017).

addresses the issue of accurate representation and inherent problems of human language, particularly in the scientific vernacular:

> Words have been allotted the task and the power of "representing thought" […] [b]ut representing in this case does not mean translating, giving a visible version of, fabricating a material double that will be able, on the external surface of the body, to reproduce thought in its exactitude.[298]

Foucault's consideration highlights the inaccuracies and ambiguities of human language as a vehicle for discourse, unable to encompass non-human animal experience in its entirety and accurately deliver it to ensure precise representations. He argues that the resultant representations formed by scientific discourse are no longer fixed in the same "world that gives them meaning […] [and exist] in a space of their own'.[299] Additionally, and even if these observations of empirical investigation of non-human animal life *can* be recorded accurately, Foucault proposes that the conversion of knowledge back from 'the non-place of language' risks omitting truths that are not prioritised by certain *episteme* or scientific paradigms.[300] Essentially, Foucauldian theory suggests that scientific discourse cannot ensure universal access to particular knowledges, as it prioritises a level of exclusivity to those within its own community. Therefore, the knowledges produced are not only compromised by inaccurate extraction techniques, but also the way in which it is recorded, documented, and then translated back from these language forms. When applied to empirical investigations concerning the non-human animal, Foucault proposes 'the living being, in its anatomy, its form, it habits, its birth and death, appears as though stripped naked'.[301]

Foucault's cynicism is constructive here as both McAdam and Fowler also encourage sceptical approaches in portraying the abilities of the scientific vernacular to capture the complexities of non-human animal life in its entirety. McAdam's David succinctly highlights science's dependence on these methods, being required to 'describe [chimpanzee behaviour] in

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[298] Michel Foucault, *The Order of Things* (Abingdon: Routledge Classics, 2002), p. 86.

[299] *Ibid.*, p. 86.

[300] *Ibid.*, p. xviii.

[301] *Ibid.*, p. 141.

the language of his trade', then against which 'data will have to be mapped'.[302] McAdam punctuates his narrative with moments of anxiety concerning the absolutism of scientific discourse, remarking on 'everybody thinking that everything we make, once made, cannot be a fiction'.[303] His professional conduct is constantly overshadowed by his inability to define his own personal feelings toward the chimpanzees he studies, against which the limitations of the scientific vernacular are accentuated further; as '[h]e struggles to describe them sometimes, to make the larger world feel the way he feels […] His papers and data are dust and chips of ice'.[304]

David's entire narrative is directed by a tendency to indulge in visceral emotionality, though always shadowed by scientific delineation; behaviours constantly allocated to a systematic scientific way of understanding social interaction. In one instance, David recalls an act of aggression by Billie who threatens Rosie's baby; '[w]hen I think of friendships I remember Rosie having her baby […] Billie moved aggressively toward her. His hair was on end […] Podo and Ghoul, as if they had been planning it, stepped directly in Billie's way […] [w]e have photos of it'.[305] For David, the concept of friendship between chimpanzees cannot exist unless it is empirically evidenced, in this case in the form of photographs, and later fitted neatly into the model of knowledge pertaining to 'cooperation tests'.[306] David anticipates the behaviours of the chimpanzees to fit into predetermined constructs of human emotion and behaviour, frustrations originating from moments where chimpanzee behaviour is no longer categorizable, or instances that propose 'their prior learning had been an illusion […] [and] to put all earlier findings in doubt'.[307]

Although David's scientific approaches could threaten bias, it is counteracted by the accompanying narratives of Mr Ghoul and other chimpanzee characters whose distinct non-human animal narrative sees David become the more familiar "Dave". McAdam's technique in Mr Ghoul's narrative, its unconventional use of syntax to depict the inner voice of the non-human character, allows an interpretation of the same encounters as well as other moments occurring

[302] McAdam, p. 165.

[303] *Ibid.*, p. 269.

[304] *Ibid.*, p. 265.

[305] *Ibid.*, p. 67.

[306] *Ibid.*

[307] *Ibid.*

around empirical operating hours. For example, Mr Ghoul reveals valuable moments unobserved by scientific investigations and overlooked by David, noting 'Dave stayed later than everyone sometimes and walked with Ghoul to his bedroom', that '[t]hey had parties […] Dave played a guitar that made Ghoul want to leave the room'.[308] These revelations evidence an indulgence in moments of independent interaction between human and chimpanzee, casting uncertainty over the scientific categorisations in David's own narrative. McKay considers McAdam's strategy to 'present multiple sides of the story' in order to find moments of correlation and interactional value.[309] Human and non-human animal narratives unite to offer an amalgamated vision of interspecies encounters, allowing for a comprehensive consideration of encounters in a more complex and multifaceted way, accurate to the complexities of the modern laboratory space to instigate a comparison between the potential richness of encounters and the selectivity of scientific documents that represent those same moments.

Fowler's *We Are All Completely Beside Ourselves* continuously looks to question science's exaltation of human language; demonstrated as Rose cynically notes '[l]anguage is such an imprecise vehicle I sometimes wonder why we bother with it'.[310] Fowler explicitly questions the role of human language as not only the principle mode by which to document knowledge of non-human animal life, but also as the characteristic benchmark against which non-human animal cognition is to be measured more broadly. Parry highlights Fowler's strategy of 'limitrophy' or 'feeding of the limit of the human', a concept she borrows directly from Derrida, to suggest *We Are All Completely Beside Ourselves* interrogates the 'political and ideological grounds upon which are built linguistic distinctions of kind between humans and chimpanzees'.[311] Parry sees Rose as a challenge to 'the hierarchal, centralised status of language to define the quality of a being's encounter with the world, and disempower traditional emphasis on the linguistic experience'.[312] These considerations are signposted by the inclusion of quotations from Franz Kafka's *A Report for an Academy*, most notably Red Peter's proclamation: 'I can portray those ape-like feelings only

[308] *Ibid.*, p. 70.

[309] McKay, p. 237.

[310] Fowler, *We Are All Completely Beside Ourselves*, p. 85.

[311] Parry, p. 196.

[312] *Ibid.*, p. 209.

with human words and, as a result, I misrepresent them'.[313] A moment in Rose's narrative highlights Fowler's enquiry, recalling an instance during her father's cognitive experiment:

> One of the early grad students, Timothy, had argued that in our preverbal period, Fern and I had an idioglossia, a secret language of grunts and gestures. This was never written up, so I learned of it only recently. Dad had found his evidence thin, unscientific, and, frankly, whimsical.[314]

This passage consolidates Foucauldian and Latourian scepticism to identify subtle influences of active scientific episteme that dictate empirical investigation, or Latour's marking, writing, coding and correcting. Fowler highlights the selectivity of scientific empiricism to suggest what is *missed*; Timothy's idioglossia theory rejected by Rose's father, determined to be 'unscientific' according to current empirical trends which originate from the active scientific episteme. Fowler then demonstrates that this particular avenue of investigation is thus never explored and, due to the absolute confidence in the scientific vernacular, is never recorded and thus never passes into existence.

Improvisory Moments: Two-Way Affective Encounters

Recently interdisciplinary efforts have endeavoured to revisit and reconsider the laboratory as a space that plays host to human and non-human animal encounters, where Latourian approaches have greatly influenced new examinations of the laboratory space and the ways these encounters are understood outside of the empirical processes reliant on human language. For example, Beth Greenhough and Emma Roe interrogate notions of 'the modern, rational, autonomous human', in order to examine 'how knowledge of the world is produced as much through habitual practices and embodied encounters as through objective and rational thought processes'.[315] They propose an interpretive approach to consider the potential in 'improvisatory

[313] Franz Kafka, *The Complete Stories*, *(*New York: Schoken Books, 1983), p. 253.

[314] Fowler, *We Are All Completely Beside Ourselves*, p. 100.

[315] Beth Greenhough and Emma Roe, 'Experimental Partnering: Interpreting Improvisory Habits in the Research Field', *International Journal of Social Research Methodology*, 17 (2014), 45-57 (p. 47).

moments' occurring *around* the activities of empirical investigation.[316] Examining particularly 'the capacities of human bodies to sense and respond to the non-human agentive world', Greenhough and Roe identify improvisory moments to include everyday habitual practices, empirical and non-empirical, within the scientific space.[317] Borrowing from these conceptualised approaches, how can literary fictional strategies look to reconsider the potential in these same improvisory moments to consider a more comprehensive picture of non-human animal life in the laboratory? Can fictional reconfigurations of the laboratory space represent the influence of the non-human animal subject on those conducting the experiments to propose self-reflection and resolve tensions between these potential moments of value and the prioritization of the empirical in scientific methodologies?

McAdam and Fowler's novels both look to explore the affective potential of these improvisory moments and their impact on both the researcher and research subject as a two-way exchange and encounter. McAdam's *A Beautiful Truth* represents David having to prompt his laboratory staff to maintain species divisions: '[h]e reminds his staff repeatedly not to interfere, no matter how attached they become. But he lets them intervene sometimes because our attachment is another shared inheritance. Empathy comes from being hurt oneself, but it's still a beautiful thing'.[318] This fictional strategy elaborates on the notion that outside the allocated temporal logics of scientific investigation exist valuable moments worthy of emphasis, in this case the scientists' ability to empathise with the emotional state of a chimpanzee. David himself describes his feelings toward the chimpanzee colony: 'he thinks of them all as his family. He loves them and wants to let them be. He wants to leave them alone completely'.[319] The previous implication of shared inheritance is further complicated by issues of 'family' and its connotations of both the traditional emotional ties of the familial unit and in terms of species phylogenetics. The insinuation obfuscates species lines, otherwise clearly delineated physically at all times within the laboratory space. McAdam raises questions concerning ethics and group-membership across these lines, prompting the reader to reconsider how they are ideologically determined, maintained and their potential to be reconsidered. David's contemplations therefore come across

[316] *Ibid.,* p. 52.

[317] *Ibid.*, p. 45.

[318] McAdam, p. 264.

[319] *Ibid.*, p. 263.

as confessional, a conscious departure from the principles of scientific empiricism for total indulgence in the visceral and something *felt* rather than articulated.

Fowler also looks to explore the potential in a two-way affective encounter within the laboratory space, though differently from McAdam, having no scientific character within the laboratory environment. One such example being that Matt, a graduate student working with Rose's father, is deeply affected by his interaction and improvisational moments with Fern that it motivates him to follow her into the laboratory space, as 'he'd stayed [at the laboratory] as long as he was able and seen Fern as often as allowed'.[320] The affective nature of these improvisory moments were certainly true of those who worked with Nim and Washoe, as Roger Fouts recalls '[t]he better I got to know my new chimpanzee friends, the more they taught me'.[321] Indeed, the entire narrative of Fowler's novel orientates around a family 'shattered by Fern's departure' after their long-term encounter.[322] Rose's narrative doubts the capacity of memory to recall events accurately, never the emotions associated with them as they represent the affecting complexities of their relationship.

Conversely, Fowler also introduces the notion of *adverse* effects resulting from these two-way encounters. When Fern comes into contact with Dr Uljevik, he 'put Fern at once into a cage with four larger, older chimps […] He said she had to learn her place. She had to learn what she was'.[323] Fowler reconsiders the potential detrimental effects on both the human and non-human animals participants during encounters. During the novel, acts of cruelty or violence carried out by either human or non-human animal are tremendously influential, always resulting in species lines being assertively re-established and an immediate retreat to the familiar terrain of human exceptionalism. Fowler does not suggest that interspecies encounters, whether the experience be overtly positive or negative, must occur in particular ways in order to contribute to reconsiderations of the non-human animal within the laboratory, but rather reemphasize that these moments exist in the laboratory at all. Fowler thus instigates considerations of the potential

[320] Fowler, *We Are All Completely Beside Ourselves*, p. 213.

[321] *Ibid*., p. 134.

[322] *Ibid.*, p. 107.

[323] *Ibid.*, p. 124.

for the same 'permeable boundaries and inter-corporeal stories' that Parry describes in the domestic setting, to be also discoverable and valuable in the laboratory space.[324]

By identifying the existence of improvisory moments *inside* the processes of empirical investigation, a more comprehensive picture of the day-to-day encounters of human and non-human animal in the laboratory begins to emerge. McAdam's poignant observation in *A Beautiful Truth* underlines the contributions of literary fiction, as David considers: '[e]mpathy comes from being hurt oneself, but it's still a beautiful thing'.[325] Along with the novel's title, McAdam draws attention to historic and perennial oppositions between the humanities and sciences; both competing for either aesthetic beauty or scientific knowledge as the predominant mode of understanding. *A Beautiful Truth* is an allusion to John Keat's *Ode on a Grecian Urn*, that proclaims precise definitions of beauty are unattainable and are only to be felt. Keat's illustrious lines '"Beauty is truth, truth beauty," – that is all / Ye know on earth, and all ye need to know', contends that there is actually no absolute *need* but a *want* for universal truth.[326] The poem suggests that beauty, and the experience of it, is the only necessary truth required to understand the world. As David's observation of empathy comes from witnessing a compassionate interaction between two chimpanzees, beyond the descriptions of scientific vernacular. Actually, it remains something *felt*: a moment of true understanding in a two-way exchange that goes unrecorded in scientific endeavours for empirical truth. The broader implication here is that these strategies of literary fiction can help to contemplate the potentialities of non-human animal life away from the limitations of articulation. By association, this sense of confidence in more aesthetic approaches instigate a reconsideration of the ways in which literary fiction can promote the legitimacy of how emotions and feeling form our understanding of human and non-human encounters within the laboratory space.

Recent interdisciplinary endeavours throughout the humanities have looked to legitimately reinvestigate the laboratory setting in terms of 'how emotions and feelings shape spaces and encounters in ways that cannot be easily be captured by the tools of language and

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[324] Parry, p. 209.

[325] McAdam, p. 264.

[326] John Keats, 'Ode on a Grecian Urn', in *John Keats: Selected Poems* (London: Penguin Classics, 2007), pp. 191-192 (p. 192).

text'.[327] As such, Greenhough and Roe endeavour to examine the ways in which a genuine consideration of emotionality can help form a more comprehensive picture of human and non-human animal encounters within the laboratory. They begin by outlining interdisciplinary interests in 'more-than-verbal forms of communications', continuing on to argue that ethical practice in research with non-human animals may be informed and reconsidered through this emphasis on somatic sensibilities.[328] This implicates a reconsideration of the legitimacy of sensory responses as ways by which to consider the legitimacy of 'animal behaviour and demeanour to signal their emotional state'.[329] Borrowing from this conceptual strategy, the chapter will look to isolate textual examples and extrapolate these same considerations to strategies of literary fiction.

In *A Beautiful Truth*, David looks to attribute credibility to moments of anthropomorphism, observing chimpanzee behavioural demonstrations of '[f]ear, humour, jealousy and peace. Every day he sees empathy, shame, the will to heal, but he fights sometimes to discuss these things credibly with those who have no sense of their own bodies'.[330] McAdam openly proposes that the emotions of fear, humour, jealousy and calm, and the words used to describe them, are not fixed but fluid: a kaleidoscope of valuable insinuations relevant to describing the human experience of non-human animal life. Once again, here McAdam encourages the idea of moments that can be felt or sensed, instances that are overlooked by the specific criteria of scientific observational recording. Fowler reiterates this, as the first portion of *We Are All Completely Beside Ourselves* places infant human and chimpanzee life literally and figuratively side by side. As Rose regards a notebook filled with 'photos from the baby books' of both herself and Fern, she also notes '[w]e've paired them so that the embodiment of emotions in child and chimp can be contrasted […] I can't see much difference in the picture of me happy and the picture whose label says EXCITED. It's easier with Fern'.[331] By subverting the empirical intention of Rose's father's 'mood studies', Fowler presents the potentialities of greater emotive complexity in non-human animals.

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[327] Beth Greenhough and Emma Roe, 'Ethics, space, and somatic sensibilities: comparing relationships between scientific researchers and their human and animal experimental subjects', *Society and Space*, 29 (2011), 47-66 (p. 49).

[328] *Ibid*., p. 50.

[329] *Ibid., p. 53.*

[330] McAdam, p. 265.

[331] Fowler, *We Are All Completely Beside Ourselves*, pp. 290-291.

Conclusion

The critical analyses of *A Beautiful Truth* and *We Are All Completely Beside Ourselves* evidenced throughout this chapter demonstrate the ways in which contemporary literature reconstructs the laboratory so as to prompt a reconsideration of the non-human animal experience within this significant scientific setting. Concentrating on inherent issues of temporality and the systems of autonomy that establish the laboratory as a hermetically closed-off, self-governing space existing separate from the wider social world, the chapter argues that contemporary literary strategies can conversely *open up* the laboratory, exposing and critiquing the specific epistemological logics operational there. Through such an approach, the laboratory can be viewed within a broader historiography of its own development that challenges preconceptions of it as an objective and purpose-built physical and conceptualised space, in turn re-complicating non-human animal existences caught within cultural shifts in laboratory practice. These shifts implicate a dominant methodological custom that exalt particular modes of scientific knowledge production, creating distinct *kinds* of knowledge. These literary approaches have the potential to read the fictional laboratory as an environment that plays host to valuable and affecting interspecies encounters, occurring both during and outside of empirical investigations dictated by the setting. Having established the nature of the laboratory space more broadly, the following two chapters now concentrate on specialized scientific sub-divisions of laboratory investigations to demarcate and distinguish between the methodological and conceptual nuances existent within sub-fields of scientific enquiry. Though based within the laboratory setting, they represent two completely different scientific situations that determine the experience of the non-human animal differently within each empirical circumstance.

Chapter Three

'The pits were designed, of course': Representing the Experimental Non-Human Animal

> The apparatuses described in this paper were designed to produce depression or despair in monkeys, i.e., the devices were created to induce measurable, quantitative psychopathological traits in subhuman primates. We do not mean to imply that depression in monkeys is analogous to depression in human beings, even though we believe it is.
>
> – Stephen J. Suomi and Harry Harlow[332]

Comparative psychology is the study of the evolutionary origin of psychological capacities of non-human animals in order to recognise and apply those same developmental models to correlative human behaviour.[333] Comparative developmental psychology is the study of specific cognitive behavioural systems during *ontogenetic* development, allowing for a comparison between subsequent models of non-human animal development and those of humans.[334] These two sub-divisions of experimental psychology and their particular epistemological operational modes will provide the scientific basis of this chapter. Just like so many branches of the empirical sciences that utilise non-human animals, comparative and developmental psychology were born from the influential works of Charles Darwin, developed further by his student George Romanes and fellow pioneering ethologist Pierre Flourens, becoming an amalgamation of biology, psychology, anthropology, ecology and genetics.[335] In terms of non-human animal participation,

[332] Stephen J. Suomi and Harry F. Harlow, 'Apparatus conceptualization for psychopathological research in monkeys', *Behaviour Research Methods and Instrumentation*, 7 (1969), 247-250 (p. 247).

[333] Mauricio R. Papini, 'Comparative Psychology', in *Handbook of Research Methods in Experimental Psychology*, ed. by Stephen F. Davis (Oxford: Blackwell Publishing Ltd, 2003), pp. 211-240.

[334] Alexandra G. Rosati and others, 'Comparative Developmental Psychology: How is Human Cognitive Development Unique?', *Evolutionary Psychology*, 12 (2014), 448-473 (p. 449).

[335] Gary Greenberg, 'Comparative Psychology and Ethology: A Short History', in *Encyclopaedia of the Sciences of Learning*, ed. by N. M. Seele (New York: Springer, 2012), pp. 658-661 (p. 658).

a relatively small species group have and continue to dominate the arena, whilst historical methodological approaches have varied significantly throughout. These groups include pigeons, rats, mice and primates due to practical logistical advantages such as accessibility to populations, breeding, maintenance, housing, and feeding, as well as their cognitive and biological similarities to humans. The cognitive and behavioural developments under observation include learning, environmental orientation, attachment, and cognitive responses to stimuli such as hunger, fear or isolation.

Stephen Suomi and Harry Harlow's apparatus guide for inducing depression or despair in rhesus macaques is representative of a significant period in the history of laboratory comparative and developmental psychology using non-human animals. The legitimisation of psychology as a valid science along with the technological advancements of the post-war era resulted in its explosive development throughout the 1950s and 1960s.[336] Scientific fascination with human cognition and developmental behaviour found non-human animals substituted as surrogates in order to explore anything from learning ability to social development. During this same period, Harry Harlow conducted his now notorious experimental investigations on infant rhesus macaques. Through explorations into the effects of attachment deprivation, maternal separation, and isolation, Harlow looked to emphasize the importance of maternal affection, bodily contact, and intimacy in the cognitive and social development of human infants.[337] Harlow's work, in particular, is drawn on throughout this chapter to exemplify experimental scientific approaches, and to provide methodological contexts against which literary reflections on them will be analysed. Subsidiary comparative psychological and experimental studies will also feature to accommodate the multi-species nature of this specific epistemological mode, particularly rats and monkeys. Focusing on short-term laboratory-based non-human animal research, the chapter will isolate and consider conceptual oppositions identified within these studies to facilitate a broader examination of fictional literary representations of non-human animal life in this particular empirical setting.

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[336] An outline of late-twentieth century psychology investigations is provided in Lauren Slater's *Opening Skinner's Box: Great Psychological Experiments of the Twentieth Century* (London: Bloomsbury Publishing, 2005).

[337] Harry Harlow, 'Love in Infant Monkeys', *Scientific American*, 6 (1959), 68-75.

The key objective of this chapter is to examine the ways in which fictional literary strategies and representations offer effective re-evaluations of the non-human animal experience when utilised within the empirical modes prevalent in comparative and developmental psychology. By analysing Lydia Millet's 'Love in Infant Monkeys', Karen Joy Fowler's 'Us' and Ursula Le Guin's 'Mazes', contemporary fictional texts that explore the production of knowledge using non-human animals within this particular epistemological setting, the chapter explores how literary fiction contributes toward reconsiderations of the non-human animal experience in short-term, multi-subject empirical investigations. How do these three fictional texts respond to the epistemological implications particular to these sub-divisions of scientific experimentation? The methodological designs of which cause non-human animals to be simultaneously more numerous and yet also more distant, making their presences *quieter*.

The experiential existence of non-human animals in the experimental setting, as with all empirical designs utilizing non-human animals to produce knowledge, are inherently linked with issues of temporality. However, logics of temporality work differently in this particular scientific mode, an empirical setting that operates through methodologies reliant on far higher levels of temporal regulation. Unlike the longitudinal cognition and language studies evidenced in Chapter One and Chapter Two, the short-term experimental investigations conducted on non-human animal subjects rarely live *beyond* the experiment itself. Rather, they exist within the stringent predetermined temporal parameters of a socially constructed empirical methodology that adheres to a strict timetable of investigation, commonly comprising of a large multi-subject group. The challenge for fictional representations is how best to negotiate temporal logics in a way that can represent the experiential existence of the non-human animal accurately but also to ensure valuable reconsiderations. Issues of autonomy, systems of separation, and logics of value are also more influential in this particular epistemological mode, defining the nature of human and non-human animal encounters within physical demarcations of the laboratory space. These key conceptual features are outlined in greater detail later in examinations of how short-term experimental researches influence the experience of the non-human animal overall. This enables a framing of the different *kinds* of knowledges created there and make visible other, less obvious human and non-human animal encounters engendered by the process. Fundamentally, it helps to identify epistemological characteristics particular to short-term comparative experimentation against which to compare fictional strategies interested in representing non-human animal life in this empirical mode.

To better consider the epistemological constructs at work within comparative and developmental psychology experimentations, the works of psychologist and philosopher Vinciane Despret offer a reflective review of empirical designs specific to this mode of laboratory research and the encounters between human and non-human animals that occur there. Despret's work is particularly useful as it offers key methodological perspectives by which to analyse and re-evaluate conceptual oppositions inherent in the scientific method, acting as an intermediary by which to approach fictional reconsiderations of the same epistemological features. This approach is especially helpful when considering the short-term nature of comparative and developmental psychology experimentations, as encounters are brief and without lengthy moments occurring *around* the empirical investigation itself. The working hypotheses of the investigations do not rely on a relationship being established between researcher and non-human animal subject, and therefore isolation and separation are prominent systems of management. Furthermore, Despret's examinations of the laboratory space reiterate that scientific sub-divisions ask certain *kinds* of questions, being perhaps methodologically similar but actually subtly different under umbrella terms related to non-human animal experimentation. Despret's helpful theoretical approaches will be outlined later in the chapter. Logically then, a brief outline of the epistemological features of comparative and developmental psychology will enable a more comprehensive exploration into literary fictional representations of the same empirical mode of producing knowledge on non-human animals.

Epistemological Features of Comparative Psychology

During the mid-twentieth century, advocates of comparative and developmental psychology began employing the non-human animal as a way by which to test cognitive function with the promissory future of identifying correlative features in human cognitive development and behaviour.[338] The non-human animal became an analogy of the human psychological sample, exacerbated by a scientific and political climate that favoured empirical investigations into human intelligence and learning.[339] A point of contention then and now amongst psychologists concerns the use of comparative methodologies to compare differences and similarities between species,

[338] Greenberg, p. 659.

[339] James Kalat, 'Evolutionary Thinking in the History of the Comparative Psychology of Learning', *Neuroscience & Biobehavioural Reviews*, 7 (1983), 309-314 (p. 310).

including humans, that are not always biologically or psychologically translational. Nevertheless, mid-twentieth century enquiries into human health saw non-human animal subjects set as the default sample against which to test potential hypotheses before applying the models of knowledge produced to human cognitive and behavioural frameworks.

The hypotheses of comparative and developmental psychology experimentation differ according to their subject focus and can be anticipated with varying degrees of precision and success. Biological experiments can trust in greater accuracy at the hypothesis stage, confirming or negating the effects of predetermined procedures regarding internal or external biological materials involving the non-human animal. When simplified, biomedical investigations would pose an initial question with the answer being either yes or no. For example, biomedical researcher Albert Sabin, working during the same period, asked: 'can rhesus monkeys offer a biological replica against which to investigate the poliomyelitis virus in humans?'. The answer was yes, or more expansively that weakened modes of the virus 'produced no cytopathogenic effect on monkey kidney epithelial cells'.[340] The avenue of enquiry is thus closed as working hypotheses are satisfied. Conversely, in comparative psychology investigative questions are more open-ended. For instance, the research design of Harry Harlow's research into maternal attachment was set up to ask the question: 'can rhesus monkeys be used as a psychological substitute in order to teach us about love in humans?'. Harlow's conclusion was that '[m]onkeys are much simpler than people […] for this very reason they give us a clearer picture of the basic love systems, the nature of variables underlying each, and the problems and perils of transition from one system to another'.[341] Harlow's answer was yes, that '[t]he well adapted rhesus may be used in an experimental design requiring completion of 50 to 100 trials a day […] a finer robot than any electrical engineer will ever devise', but this conclusion only confirms the non-human animal psychological model, prompting considerations of *how* to then test these psychological functions.[342] Harlow's investigations remained ever speculative, as psychological phenomena are more unquantifiable compared to biological materials; hypotheses are more difficult to test and resolve. Each result works perpetually toward a definitive, yet ultimately unknown, conclusion.

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[340] Albert B. Sabin, 'Noncytopathogenic Variants of Poliomyelitis Viruses and Resistance to Superinfection in Tissue Culture', *Science*, 120 (1954), 357.

[341] Harry F. Harlow, *Learning to Love* (Albion Publishing Company, 1974), pp. 3-4.

[342] Harry F. Harlow, 'The Monkey as Psychological Subject', *Integrative Psychological and Behavioural Science*, 42 (2008), 336-347 (p. 345).

Therefore, hypotheses of comparative and developmental psychology are guided by a principal objective, but empirical processes are in a constant state of refutation, conjecture, alteration and reapplication.

It is the ambiguous and ever-changing nature of research methodologies in comparative and developmental psychology experimentation that led Harry Harlow to his infamous researches into depression, social isolation and maternal attachment in infant rhesus macaques. Undoubtedly, the reasons for Harlow's infamy have changed over time, appropriated by the dominant scientific paradigms of the period and arbitrated today by the particular moral and ethical sensibilities they implicate. From initial research at the University of Wisconsin from the early 1930s, his work and reputation both inside and outside the field of science has shifted from the highly revered to widely condemned. As Blum highlights, Harlow's successes during the 1960s meant 'Professor Harlow was suddenly consulted on a starting range of child-rearing techniques; not just love'.[343] Yet only a little while later, 'Harlow was suddenly accused of being a scientist on the wrong side of truth […] in the shifting culture of the 1970s, it was mother love that was the real problem. His pro-parenting stance had turned him into a politically incorrect scientist'.[344] By the time of his death in 1981, Harlow's work was seen as wholly unethical, as modern scientific practices involving non-human animals then looked to redefine and renegotiate issues of ethical treatment and care. Today, his work is often evoked in relation to issues concerning the ethical treatment of non-human animals in the laboratory space as well as broader animal rights activism. Resonations of Harlow's work today remain clear in terms of its advancement of the wider field of psychology, though his methodological approaches are ultimately disapproved regarding in his treatment of non-human animals. Harlow's infamy is therefore valuable in terms of its enigmatic nature, offering a variety of opinions and conceptual considerations of his work, including those contributions made by fictional strategies.

[343] Deborah Blum, *Love at Good Park: Harry Harlow and the Science of Affection* (Chichester: John Wiley & Sons Ltd, 2003), p. 175.

[344] *Ibid.*, p. 231.

Introducing the Fictional Texts

The three selected fictional texts will be employed into two significant strands of analysis in the chapter. Lydia Millet's 'Love in Infant Monkeys' will be examined as part of a specific case study focusing on Harlow's work using non-human animals in experimental comparative developmental psychology and the distinct empirical logics that operate there. However, this is situated within a broader study of epistemological features inherent to the experimental laboratory setting that then incorporates and analyses the literary strategies of Fowler's 'Us' and Le Guin's 'Mazes'. By arranging the fictional materials this way it allows for a more comprehensive overview of this specific mode of scientific investigation and the conceptual oppositions identified within it; each fictional representation is interested in different empirical features of the experimental situation that utilizes the non-human animal. The amalgamation of these three fictional texts in this manner will ensure a more encompassing cross-section of fictional strategies looking to contribute to discussions concerning the epistemological nature of experimental scientific investigation. Additionally, and essential to the core investigative objectives of the chapter, all three texts are fictional interventions in understanding scientific empirical systems of knowledge production concerning non-human animals within the experimental setting.

Lydia Millet's *Love in Infant Monkeys* is a collection of short stories that contains a fictional representation of Harry Harlow in its titular story, named after Harlow's article of the same title featured in the scientific journal *Scientific American* in June 1959. Millet's story collection pairs a wide range of fictional reiterations of celebrities and public figures with non-human animals, both tending to provoke sympathy yet remaining fundamentally unknown. The collection is a series of literary commentaries on the way in which both groups, the celebrities and their non-human animals, are subject to various public narratives, becoming literal fictions of their own created through observation, speculation, and projection that which they then transform into. These fictional strategies of interspecies encounter provoke a consideration of our relationships with the non-human animal, signifying that proximity engenders feelings of intimacy, but potential capacities for cognitive experience remain ultimately unknowable. The collection finds Millet proposing that fiction, the space of imagination, is where remarkable and affective revelations can occur in terms of considering the non-human animal.

Millet's short story 'Love in Infant Monkeys' is a fictional speculation about Harlow's cognitive developmental psychology experimentations. The text affects how we understand scientific methodologies of short-term cognitive developmental studies by dramatizing the affective potential in conducting such emotively drastic experimentations on the human experimenter, in such a way that may alter an individual psychologically, emotionally, and influence interpersonal relationships. Millet contrasts Harlow's apathetic treatment of his non-human animal subjects with a dramatization of subconscious emotional turmoil in order to examine the ways in which the scientific setting implicates certain emotive approaches toward the non-human animal and consider why these specific terms of encounter are so doggedly maintained. 'Love in Infant Monkeys' focuses on a specific set of epistemological features of the experimental setting that includes issues of temporality and autonomy, in addition to methodological systems of separation between human and non-human animal bodies. Millet exploits numerous paradoxes present in Harlow's investigation to frame her fictional reconstruction; Harlow ultimately wanted motherly love to be taken seriously but objectified motherhood in order to achieve it. These paradoxes in Harlow's empirical investigations will be outlined in the following section.

Fowler's story 'Us' is a fictional reimaging of the mutual interspecies history that exists between humans and rats, with the experimental setting as the most significant point of convergence for modern-day encounters. In terms of how Fowler's text affects our understandings of the scientific methodology of the chapter, 'Us' contextualises scientific practices by prompting a reconsideration of broader scientific trends of appropriation and re-appropriation of the rat into empirical investigative design and, conversely, question future research directions. Fowler offers a fictional reinterpretation of the experimental situation that highlights the anthropocentric nature of scientific empiricism in order to propose alternative, biocentric approaches to extract mutually valuable knowledges on non-human animal life, focusing on logics of value as epistemological features in the experimental setting. Le Guin's 'Mazes' dramatizes the physical intimacies of human and non-human animal encounters to highlight overlooked capacities for greater understanding during these moments. Similarly to Fowler, Le Guin dramatizes anthropocentric approaches of empirical sciences to encourage a reconsideration of the scientific methodologies associated with comparative psychological experimentation. Le Guin depicts the experimental setting to contemplate the potentialities in moments that occur between human and non-human, including the reciprocation and

articulation of bodies, as well as explorations into other kinds of intelligence. Whilst the epistemological logics featured within these two particular fictional texts perhaps overlap at points, when considered alongside Millet's 'Love in Infant Monkeys' all three fictional texts will coalesce to form a more comprehensive overview of the experimental setting that would otherwise not be possible should they be featured independently.

The Ambiguities in Harry Harlow's *The Nature of Love*

In relation to the key investigative purposes of this chapter this section has two primary objectives. Firstly, to demonstrate the nature of the scientific climate that led to Harry Harlow's comparative psychology experimentations on non-human animals to investigate maternal love, affection, and attachment and later the nature of depression and social isolation. Secondly, to identify certain paradoxes evident in his work, as well as the subtle ambiguities in his application of emotive terminologies in his empirical investigation, such as *love* and *affection*. These two objectives are complimentary to endeavours to identify and isolate valuable human and non-human encounters within an empirical setting that threatens a species distance that *quietens* non-human animal presences. Such instances will then be contrasted against the fictional literary texts that look to negotiate these same conceptual challenges to offer an effective reconsideration of this particular epistemological mode that produces knowledge on non-human animal life in the laboratory.

At the time Harlow commenced his research, the field of psychology had only relatively recently solidified its position as a legitimate science and looked to establish the standard against which to model infant care and cognitive development during the post-war era. The reductionist works of behavioural psychologist John B. Watson sought to prove that love and similar emotions were 'as amenable to manipulation as any other basic behaviour […] observable and measurable and controlled by the mastery of science'.[345] In his paper *Studies in Infant Psychology* published in 1921, Watson remarked: 'the young human animal is looked after from every material standpoint in a way that would have made our frontier ancestors, who simply let their babies

[345] Blum, *Love at Goon Park*, p. 38.

grow, doubt our sanity'.[346] Watson had gained international renown for his experiments on "Little Albert", the application of classical psychological conditioning established by the positive and negative reinforcement of emotive cues, tested on rats and applied to a human psychological surrogate, a 9-month-old boy named Albert.[347] Now regarded to be one of the most controversial experiments in the history of psychology, for obvious reasons as well as Watson's clumsy post-experiment deconditioning, the result was the emergence of scientific guidelines for standardized parenting practice, what Blum refers to as 'the concept of scientific motherhood'.[348] The resultant guides, leaflets and books warned against overindulgence of parental touch, intimacy, and affection, which remained the dominant paradigm until the late 1940s.

Later in the early 1950s, British psychologist John Bowlby argued that love and attachment were in fact primary emotions, not secondary drives of primary stimuli like hunger, thirst or pain.[349] Bowlby's work culminated in a commission by the World Health Organisation to investigate links between mental health and homeless children following World War II. Published in 1951, Bowlby's report insisted that 'what is believed to be essential for mental health is that the infant and young child should experience a warm, intimate, and continuous relationship with his mother (or permanent mother-substitute) in which both find satisfaction and enjoyment'.[350] Bowlby's clear reprioritizations of love and affection in maternal relationships resonated deeply with Harlow, who looked to then contribute to the 'compassionate momentum' in the empirical crusade for motherly love and affection.[351] Harlow's intention is clear in his presidential address during the 66th Annual Convention of the American Psychological Association in 1958, in which he presented the results of his comparative developmental experiments on love and maternal attachment, entitled 'The Nature of Love'. Harlow's address begins: '[l]ove is a wondrous state,

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[346] John B. Watson, and Rosalie R. Watson, 'Studies in Infant Psychology', *The Scientific Monthly*, 13 (December, 1921), 493-515 (p. 493).

[347] John Watson, and Rosalie Rayner, 'Conditioned emotional reactions', *Experimental Psychology*, 3 (February, 1920), 1-14.

[348] Blum, *Love at Goon Park*, p. 41.

[349] John Bowlby, 'The nature of the child's tie to his mother', *International Journal of Psycho-Analysis*, 39 (1958), 350-373 (p. 371).

[350] John Bowlby, *Maternal care and mental health: a report prepared on behalf of the World health Organisation as a contribution to the United Nations programme for the welfare of homeless children*, 2nd edn (Geneva: World Health Organisation, 1952), p. 11.

[351] Blum, *Love at Goon Park*, p. 60.

deep, tender, and rewarding […] it has been written better by poets and novelists'.[352] Harlow's admission here is particularly potent as it admits a human emotive capacity that evades scientific determinations and is better interpreted by tools available to those in the humanities. Harlow's indulgence in emotive language precede the contradictions that will be evidenced throughout his hypotheses and research aims: to understand something so emotively complex and exquisite through scientific means that are wholly emotionally destructive.

Harlow directly rejects Watson's dominant scientific motherhood theory during the introduction of 'Love in Infant Monkeys', claiming that evidence up to this point was 'lost in a jumble and jungle of confounded variables'[353] and thus wrongly conclusive that '[t]he mother is associated with the reduction of the primary drives – particularly hunger, thirst, and pain – and, through learning, affection or love is derived'.[354] The following year Harlow published 'Love in Infant Monkeys', which also begins '[t]he first love of the human infant is for his mother […] sometimes regarded as a sacred or mystical force'.[355] Harlow's use of the term "love" becomes a refusal to conform, an acknowledgement of its complex nature as an emotion that eludes sub-delineations of attachment. Lauren Slater aptly observes that Harlow's core motivation was 'to talk about love […] [h]is experiments were long meditations on love, and all the ways we ruin it'.[356]

These analyses of Harlow's work are beneficial to the broader investigative purposes of this chapter due to paradoxes evident between his ultimate research goals and his scientific methodology. As Harlow looked to crusade against refraining to show effusive love to your infant, he wanted to also endorse value in moments of close affection, bodily contact and intimacy between mother and infant. However, in order to respond to and ultimately displace the dominant scientific motherhood paradigm, Harlow was required to reply in kind; using comprehensive scientific evidence and data gleaned from the cognitive models found in infant rhesus macaques. In order to disprove or "cure" one form of emotional violence, Harlow needed to perform acts of emotional violence himself, absolutely believing that the ends justified the

[352] Harry F. Harlow, 'The Nature of Love', *American Psychologist*, 13 (1958), 673-685 (p. 673).

[353] *Ibid.*, p. 674.

[354] *Ibid.*, p. 673.

[355] Harry F. Harlow, 'Love in Infant Monkeys', p. 68.

[356] Lauren Slater, 'Monkey Love', *The Boston Globe*, 21 March 2004.

means. As Slater concisely surmises, Harlow believed that 'to understand the human heart you must be willing to break it'.[357] Herein lies the paradoxical nature of Harlow's scientific legacy, that his work ultimately humanized parent-infant relations through processes of dehumanization. Harlow's relentless pursuit of a positive conclusion, though the everyday implications of his methodology are wholly adverse and doubtlessly affecting, throws into doubt Harlow's overall detachment from the process. Indeed, it is here that literary fiction finds Harlow and his use of non-human animals so intriguing as a way by which to reconsider the non-human animal in this empirical setting. Can one remain wholly detached from such emotional violence?

The contrast between Harlow's ultimately humanitarian research aims and ethically questionable methodologies in his use of non-human animals subjects is not at all a new revelation. A former graduate student of Harlow's, John P. Gluck, summarises manifold views of him as 'ethically thoughtless, as an animal husbandry advocate, as a creative innovator […] as self-absorbed, as generous, and as a sadist experimentalist'.[358] Gluck goes on to identify Harlow as a 'thoroughgoing experimentalist with an unsentimental view of animals'[359] and ultimately 'the plight of the experimental animals could be obscured by the abstract goals of the experiment'.[360] Harlow's emotional sadism is self-evident, as Blum records him saying '[t]he only thing I care about is whether the monkeys will turn out anything I can publish. I don't have any love for them. Never have. I don't really like animals'.[361] Again the paradox is reaffirmed, with Harlow being both 'the man who had redefined the bond between mother and child', and, as another former graduate William Mason describes, the man who set out to '[m]ake these monkeys psychotic – take them and destroy them […] the work was really violating ordinary sensibilities'.[362] Certainly, Harlow's written accounts support his sarcastic callousness. In his article 'The Monkey as a Psychological Subject', a retrospective consideration on the choice of using rhesus macaques in his experiments for over twenty years, Harlow notes:

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[357] *Ibid*.

[358] John P. Gluck, 'Harry F. Harlow and Animal Research: Reflection on the Ethical Paradox', *Ethics and Behaviour*, 7 (1997), 149-161 (p. 150).

[359] *Ibid.*, p. 155.

[360] *Ibid.*, p. 160.

[361] Blum, *The Monkey Wars*, p. 92.

[362] *Ibid.*, p. 96.

> The lemur fortunately was not one of the nocturnal species, and he cooperated to the full extent of his limited capacities […] In spite of the fact that he failed to solve any but the shortest delays, he was a well-mannered animal who accepted his position as imbecile of the primate order with perfect grace.[363]

This humorous summation as to why the lemur was eventually excluded during initial experimentations reveals a characteristic of Harlow's writing, something Gluck refers to as his 'rhetorical disguise'.[364] Gluck recounts that Harlow's speeches and writing 'were salted liberally with alliterations and rhymes. Poetry, science, and brutally directed descriptions were fused together', evidence of Harlow's thought process away from the strict protocols of scientific objectivity that scientific writing otherwise promotes.[365]

Vinciane Despret and the Articulation of Bodies

Vinciane Despret's work concerning the experimental setting offers a series of valuable theoretical approaches adept at critiquing epistemological features in order to better identify conceptual oppositions, which can be utilized to compare literary investigations of the same. For example, Despret identifies the taboo surrounding the anecdotal practice that Gluck identifies in Harlow's writing, a liminal or intermediary form between direct observation and official scientific materials. Within the laboratory, Despret observes that 'an anecdote is generally defined, in this area, as an *uncontrolled* observation; that is to say, it is not accompanied by the "right" interpretive key'[366], and leads to what scientists consider to be a 'disastrous multiplication of possible motives'.[367] Yet Despret instead proposes an extant mode of information relay that 'constitutes a body of tacit knowledge that is never mentioned within official reports but is freely used during the course of actions, often in the form of comical stories'.[368] Whilst scientific dogma

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[363] Harlow, 'The Monkey as Psychological Subject', p. 337.

[364] Gluck, p. 155.

[365] *Ibid.*

[366] Vinciane Despret, *What Would Animals Say if We Asked the Right Questions?* (Minneapolis: University of Minnesota Press, 2016), p. 43.

[367] *Ibid.*, p. 93.

[368] *Ibid.*, p. 90.

would warn against any implications of anthropomorphic tendencies, Despret goes on to propose that actually 'anthropomorphism is always there, for what could be more anthropomorphic than an apparatus that requires an animal to deny his own habits'.[369] Taken together, Despret's considerations here liberate the logics of scientific empiricism to imply that anecdotal evidence holds value as a form of making sense of non-human animal behaviour; a mode of articulating and communicating experience.

More broadly, Despret's considerations also include the influence of the experimental situation, resulting in non-human animals responding to *other* questions wholly different from those which investigators believe they are asking, even unknowingly providing the answers.[370] Despret proposes that 'animals certainly respond to a question, but it is not the one we pose to them'[371] as scientific methodological designs only ever 'reduces the problem to its simplest expression', limiting non-human animal capacities for articulation and other potential exchanges of valuable knowledge.[372] As empirical methodologies of the experimental situation enforce more systems of separation and physical distance between human researcher and non-human animal subject, Despret's deliberations on experimentational designs and the different kinds of interactions they implicate are particularly valuable. She considers 'the real world of a laboratory, as exceptional as it is, in which beings of different species work together', and the ways in which the experimental setting influences and shapes both human and non-human animal participants and subsequent encounters that occur there.[373] Despret argues that this real world, consists of inter-species social relationships and intelligences born out of the habitual practices and regular presences dictated by empirical investigation.[374] She highlights the capacity for inter-species adaptation within the experimental laboratory, or a mutual change in human and non-human animal behaviours to accommodate and negotiate epistemological systems of empirical investigation. She examines the potential of bodily proximities, articulations, and responses

[369] *Ibid.*, p. 94.

[370] Vinciane Despret, 'Who Made Clever Hans Stupid?', *Angelaki: Journal of the Theoretical Humanities*, 20 (2015), 77-84.

[371] Vinciane Despret, 'Thinking Like a Rat', *Angelaki: Journal of the Theoretical Humanities*, 20 (2015), 121-134 (p. 130).

[372] *Ibid.*, p. 131.

[373] Vinciane Despret, *What Would Animals Say*, p. 96.

[374] Vinciane Despret, 'Beasts and Humans', *Angelaki: Journal of the Theoretical Humanities*, 20 (2015), 105-109.

between researcher and subject to propose '[b]odies are articulating, and become articulated' during encounters.[375]

Despret also examines the anthropocentric tendencies of scientific empiricism to suggest that hypotheses and their resultant methodologies have often already established the limitations of the cognitive or behavioural capacities of the non-human animal. By highlighting instances of closed-minded obstinacy within scientific experimentations, Despret advocates for more liberal approaches that permit degrees of ingenuity and initiative on the part of non-human animal subjects to determine investigative avenues. She notes '[l]aboratories might perhaps acquire more interest if scientists considered them as places of exhibition […] In place of routine and repetitive protocols, scientists could instead substitute inventive tests through which the animals could *show what they are capable of* when we take the trouble of giving them propositions that are likely to interest them'.[376] Through subverting scientific empirical practices in this way, Despret contends there to be *greater* value in the models of knowledge extracted within this particular epistemological setting. Like Haraway, Despret asserts science and its researches to be socially constructed. She emphasises innate scientific predispositions to satisfy dominant social and cultural influences that ultimately dictate broader research trends and determine their future direction, whilst also considering the wider implications for the non-human animal experience caught within those investigative modes and empirical strategies. The theoretical approaches briefly outlined here evidence a series of valuable reconsiderations by Despret concerning key epistemological features of the experimental setting. These approaches represent a mode of rethinking experimental empirical science that will be employed to compliment, facilitate, and challenge fictional literary representations in order to accentuate the alternative ways in which this mode of knowledge production can be reconsidered. Firstly however, Despret's approaches will contribute toward a conceptual analysis of the specific empirical practices and procedures of short-term experimentation that implicate the non-human animal experience of that same space.

[375] Despret, 'Responding Bodies and Partial Affinities', p. 70.

[376] Despret, *What Would Animals Say*, p. 35.

Short-Term Experiments: Temporality, Autonomy, and Bodily Separation

This section briefly outlines the key epistemological features of short-term experimental researches using non-human animals, or how this specific empirical mode works to produce knowledge, processes that the three literary fictions look to elaborate on. Using Harlow as a demonstration throughout the chapter, the practicalities of fictionally representing the non-human animal in this scientific setting will be shown to be intrinsically tied to fundamental, inter-reliant systems of temporality, autonomy and the separation of bodies. Short-term comparative experimentation implicates a different form of temporality and so it is understandable that instances of fictional representation would look to present themselves in a different way. In experimental practice, there are limited opportunities for one-on-one encounters between researcher and research subject as no mutual reciprocation is needed to create knowledge, there being more points of separation installed in a multi-subject investigation to avoid what Harlow considered to be the 'jumble and jungle of confounded variables'.[377] These investigations often rely on collective samples to produce statistical data and determine a general trend. Also, experimental comparative psychology researches depend precisely on the *absence* of moments for close bodily interaction and encounter between the human researcher and the non-human animal subject, as well as between the non-human animals themselves, for fear of contaminating results and the ambiguous nature of whatever cognitive phenomena is under investigation. All these epistemological features result in the individual non-human animal presences becoming far *quieter* in the experimental setting. This term is used to describe the situation of non-human animals within distinct epistemological systems of the experimental setting that deliberately or inadvertently restrict or reduce encounter opportunities between human researchers and non-human animal subjects. Encounters include forms of interspecies interaction, communication, and bodily and emotive exchange that would otherwise be permitted in other scientific fields in which methodological designs utilize the non-human animals to produce knowledge.

These wholly reductive processes present a problem for those looking to create a fictional representation of the non-human animal in this setting and under these epistemological logics. Scientific documents and materials are the only evidence of the non-human animal in the laboratory space save for infrequent professional autobiographies or memoirs. Fiction writers must consider how to negotiate or reanimate these systems of temporal filtration and separation,

[377] Harlow, 'The Nature of Love', p. 674.

complicated by abstractions of data to collective samples. Does the myopic nature of empirical investigative design truly demonstrate the infant monkeys' everyday experience is as truly void as results suggest? Or is it the fact that this vacuum of affective emotions is exactly what the experimentations are looking to investigate and are mistaken as quotidian reality? These epistemological implications show how our imagination or ability to empathise struggles to reveal what it might be like to be a non-human animal subject in this empirical setting and so literary reconfigurations must offer alternative approaches to prompt effective reconsiderations.

Narrative Strategy in Lydia Millet's *Love in Infant Monkeys*

Millet's narrative strategy in 'Love in Infant Monkeys' is to not depict one single non-human animal character, as an extended representation of a single infant exploring what it is to be or feel like an infant monkey who 'had known no mother' would not be the most effective depiction.[378] Instead, Millet opts to fictionally represent the experimenter Harlow, in order to encapsulate the broader experience of the non-human animal occupying the same laboratory space. This allows Millet to reprioritize and re-autonomize non-human animal presences within an empirical setting that exalts one-way methodological systems of encounter, unlike the two-way interactions of long-term cognition and language studies. Millet's narrative approach accommodates and adapts to the nature of short-term, multi-subject experimentations where human and non-human animal proximities are further removed and more distant. Through this narrative approach, Millet can encapsulate multiple non-human animal presences that are otherwise caught within empirical designs that continuously enforce systems of separation, isolation, and de-stimulation. This method by which to rethink the experimental setting is contrary to Despret's more confrontational, animal-centric approach that connotes the artificiality of scientific empirical design and the situational circumstance it places the non-human animal into. She considers: 'the rhesus monkey literally tortured by Harlow could hardly find means to resist the apparatus and the questions that are addressed to him/her', deciding that actually 'it is the animal that articulates the system'.[379] In comparison, Millet's narrative strategy therefore initially intimates an element of conformity and compliance with the empirical logics of

[378] Harlow, 'Love in Infant Monkeys', p. 70.

[379] Vinciane Despret, 'The Body We Care For: Figures of Anthropo-zoo-genesis', *Body and Society*, 10 (2004), 111-134 (p. 123).

experimental researches, a strategy that *could* threaten a sense of distance from the non-human animal.

Harlow believed his own rhesus macaques to be free of any contamination, claiming 'we are better monkey mothers than are real monkey mothers thanks to synthetic diets, vitamins, iron extracts, penicillin, chloromycetin, 5% glucose, and constant, tender, loving care'.[380] The inclusion of emotive love and affection at the end of this inventory highlights Harlow's characteristic tendency toward sarcasm. However, it is also heavily ironic as methodological investigations of maternal love and affection rely entirely on their absence in order to, in accordance with the protocols of scientific empiricism, 'make Harlow feel entitled to talk about love'.[381] In his book *Love in Infant Monkeys*, Harlow demonstrates how non-human animals presences are quieter in the experimental setting, recording: '[w]e placed eight newborn monkeys in individual cages, each with equal access to a cloth and a wire mother'.[382] These eight non-human animal subjects form the collective sample that will produce the empirical outputs of Harlow's investigation into love and maternal attachment, ultimately showing 'contact comfort is a decisive variable in this relationship [between mother and infant]'.[383] In terms of quotidian experience, the subjects are completely isolated from one another at all times with only the artificial cloth and wire surrogate mothers to interact with as the methodology prescribes. Interestingly, there is a willingness on Harlow's part to gender the cloth and the wire, maintaining a sense of maternal presence during investigations whilst also implying that it is possible to be "a mother" who entirely lacks softness. Results are presented as collective data, usually in graphs along with a summarised account to accompany the statistics, for instance:

> Strong preference for cloth mother was shown by all infant monkeys. Infants reared with access to both mothers from both (*top chart*) spent far more time on the cloth mother (*coloured curves*) than on the wire mother (*black curves*). This was true regardless of whether they had been fed on the cloth (*solid lines*) or on the wire mother (*broken lines*). Infants that had known no mother during their first eight

[380] Harlow, 'The Nature of Love', p. 675.

[381] Despret, 'The Body We Care For', p. 124.

[382] Harlow, 'Love in Infant Monkeys', p. 68.

[383] *Ibid.*, p. 70.

> months (*bottom chart*) soon came to prefer cloth mother but spent less time on her than the other infants.[384]

The everyday realities of the eight infant macaques are reduced to selected observed behaviours prioritised over others in accordance with the objectives of the investigation and indicated here as lines on a graph. As Despret observes, Harlow's results demonstrate 'a vital need to touch something soft […] this vital need that needs to be studied, dissected, and measured'.[385] These ninety words encapsulate the experience of these eight non-human animal subjects specifically in regard to maternal attachment, or more precisely the lack of it. During this time, the infant macaques were subjected to other studies into fear, open-field anxiety, curiosity, and early mothering tests, all of which are also translated into data and presented as graphs. They are always alone, yet '[t]here are still many more things to take away […] to evaluate the effect of their withdrawal'.[386] The linear temporal logics of the scientific investigation are filtered, fixated on moments prioritised by the experimenter and the quotidian experiences of the infant monkeys are lost having been never recorded and thus never outputted.

Millet's fictional reconfiguration focuses around a period in Harlow's life that followed his investigations into motherly love and the 'big-city world of baby care expertise', following his explorations into isolation and depression.[387] The first section of the story quickly establishes his professional position, that '[w]hen it came to the treatment of research animals, Harry was squarely in the mainstream. Only his willingness to speak bluntly was avant-garde'.[388] Millet's narrative is then interceded by a succinct paragraph of Harlow's methodological approaches:

> One way to prove the hypothesis was to take a newborn monkey away from its mother and never give it back. Put it in a bare box, observe it. Anxiety first, shown in trembling and shaking; then come the screams. Watch it huddle, small limbs clutching. Make careful notations […] Repeat experiment with numerous infants.

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[384] *Ibid.*

[385] Despret, *What Would Animals Say*, p. 148.

[386] *Ibid*., 149.

[387] Blum, 'Love at Goon Park', p. 172.

[388] Lydia Millet, 'Love in Infant Monkeys', in *Love in Infant Monkeys* (New York: Soft Skull Press, 2009), pp. 93-106 (p. 96).

> Make notations […] Observe the birth of infants. Observe that the longest-isolated mothers kill infants by chewing off fingers and toes or crushing heads with their teeth. Notations […] Observe: Time after time, baby monkeys return. Bad mother is better than none.[389]

Millet's subtle implementation of free direct discourse in this particular sequence could be read as establishing the narrative setting "inside" Harlow's mind, a dramatization of his own internal monologue through a stream of consciousness technique. Reminiscent of James Joyce's seminal *Ulysses*, a stream of consciousness technique allows Millet to generate a mindscape of Harlow's psyche in which deliberate and logical thought intermingles with immediate visceral reaction and emotionality. It is a significant attempt by Millet to literarily represent 'the evanescent events of interior experience', as Harlow's conscious and unconscious perceptions co-exist simultaneously to implicate multiple interpretations that work to dissolve tendencies toward the logics of scientific empiricism.[390] Such a technique could threaten to distort reconstructions of the experimental laboratory space and the non-human animal presences within it, but actually Millet's deployment specifically looks to negotiate around the epistemological logics at work in this particular empirical setting.

Certainly, Millet's narrative strategy compartmentalises the linear temporalities of the empirical investigation and those of the non-human animal experience implicated within it, a mode of condensation that allows Millet to employ the epistemological features of this scientific setting dramatically. By frequently punctuating Harlow's stream of consciousness narrative with systems of empirical observation and documentation, Millet reemphasizes the scientific objectives of the investigation in order to contrast them against the emotive effects that the fiction then looks to reprioritise. Methodological designs and empirical observations are reinterpreted, simplified, and reduced to their basic function and affecting consequence, resulting in a sardonic take on Harlow's investigative process. The satirical short, succinct diction employed in Millet's narrative depreciates the nature of scientific empiricism in this instance, questioning its overall aims and the moral implications of its chosen methodology. It also forces a reconsideration of how far empirical investigations need to be taken before hypotheses and

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[389] *Ibid.*, p. 97.

[390] Patrick Colm Hogan, 'Parallel processing and the human mind: Re-understanding consciousness with James Joyce's *Ulysses*', *Journal of Literary Semantics*, 42 (2013), 149-164 (p. 150).

predictions are deemed satisfied. Millet employs this brusque mechanomorphic dialogue throughout the narrative, as 'Harlow got in the car. Drove. Wasn't far. Hated faculty parties, hardly ever went to them: frivolous. Took him away from his work'.[391] The result is Millet's suggestion that in fact Harlow may be mechanomorphic too and proposes elements of misappropriation and misapplication, rendering him a character on the periphery of the social world and wholly unfamiliar outside of the investigative setting.

The narrative commences at the laboratory after-hours, outside of the temporal logics of the laboratory's operating hours, though crucially the non-human animals remain within the temporal logics of the experimentations. Here Harlow is depicted as a self-exiled recluse whose default position is to be at the laboratory and all the while indulging his functionable alcoholism. Millet's strategic decision to employ a first-person narrative is interesting as it must approach any depictions of the non-human animal experience indirectly, without losing key epistemological characteristics of the empirical setting. To this end, Millet's narrative finds non-human animals are only ever glimpsed at, seen in passing, and dubbed simply as 'the experiments'.[392] She writes:

> Walking along the row of vertical chambers, he gave cursory glances inside – one, two, three subjects in a row had given up trying to climb out of their wells of isolation. The pits were designed, of course, to make it impossible to escape. One subject scrambled and fell back, a weak young female. She looked up with her great round black eyes. She was afraid, but still plucky. Still game to try and get out, changer her situation. The others were abject at the bottom of their separate holes […] Plucky got you nowhere if you were a lab monkey.[393]

The circumstances of the non-human animals are obviously and deliberately miserable, always interpreted through Harlow's indifference and relentless pursuit of scientific truth. The narrative then flits between the objective and subjective, describing the young macaque as 'plucky' in the face of 'designed' despair. As Harlow looks into the pit: '[s]he squeaked at him. Well, not at him, technically. She did not know he was there; she could not see him. She could see no one. She was

[391] Millet, p. 99.

[392] *Ibid.*, p. 98.

[393] *Ibid.*, p. 99.

alone'.[394] Harlow's rhetorical slip is quickly corrected as his stream of consciousness narrative resorts to the empirical once again. Millet thus creates the impression that Harlow's scientific objectivism is dominant and yet wavering at times; confused with personal emotive responses to the subjects themselves though always corrected and righted. Millet's narrative strategy here insinuates an element of restriction in terms of the perceptive capabilities of the experimenter, an idea that correlates closely with Despret's thought: 'researchers compartmentalize the research; the animals do not stop prompting them to decompartmentalize it'.[395]

Millet's reincarnation of Harlow is one fraught with irony through his use of rhetorical devices or anecdotal evidence to buoy his empirical scientific reasoning. In his own writings, Harlow made clear that anecdotal evidence is indeed unscientific, being too quick or easy to evidence something science would consider genuinely revealing during encounters between human and non-human animals in the laboratory space. The inoperability of anecdotal evidence as scientific data rests on it being non-replicable; considered unreliable or empirically useless. But then what kind of vehicle is an anecdote and what does it accomplish for Harlow? He must have considered rhetorical renditions to be good articulations of *something*, as demonstrated in his recollection of Tommy, a sphinx baboon, who 'was intellectually endowed, but testing was difficult […] because this baboon fell head over heels in love with one of our testers'.[396] Harlow dismisses the potentially distortive properties of anecdotal evidence, adopting the writing style in order to help communicate interactions with a non-human animal in a more affecting and memorable way. Importantly, it is for the same reasons that Harlow has remembered this particular subject himself. Consequently, the anecdote becomes something *more* credible; a collation of actions, behaviours, and interactions that relays information and implicates a deeper set of perceptions at play.

As the narrative progresses Harlow leaves the laboratory to attend a staff party, but only on the premise that it allows him the '[c]hance to talk to Steve [Suomi] again about the chambers'.[397] During the party sequence, Millet confuses appropriations between Harlow's scientific investigative approaches and social interactions; any change in his cognitive behaviour

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[394] *Ibid.*

[395] Despret, 'Thinking Like a Rat', p. 130.

[396] Harlow, 'The Monkey as Psychological Subject', p. 338.

[397] Millet, p. 101.

is difficult to identify as he moves from inside to outside the laboratory setting. Certainly, Harlow's point of reference for each social interaction during the party is determined by their role at the laboratory or research interests, remaining uninterested in individual's names or their attempts to socially or emotively connect with him. For instance, he speaks to 'a new female grad student'[398], 'fat payroll'[399] and a 'girl from East Germany who was interested in the nuclear-family experiments'.[400] The undertones of Harlow's narrative reveal an aspect of Millet's narrative strategy that blurs the lines of gendering and objectification; especially outside the context of empirical scientific investigation. Millet offers an ironic dramatization of the story's opening: 'Harry Harlow had a general hypothesis: Mothers are useful, in scientific terms. They have an intrinsic value, even beyond their breast milk. Call it their company'.[401] By the time we meet Harlow in Millet's narrative, he does not differentiate between females, whether they be human or non-human animals, but instead applies his working empirical hypotheses and methodology to all he encounters.

The paradoxical nature of Harlow's prioritising motherhood as having "intrinsic value" but only ever "in scientific terms" is a key thematic throughout the narrative. Millet reiterates Harlow's ultimate goal is proving that maternal touch and affection are vital for human infant care and development, though it remains something always far-off and remote from himself. Referring to the sympathy exhibited by the grad student for his wife's illness, Harlow cynically thinks '[t]he free love ones were maternal […] Save it up for the kiddies, he thought. Wasted on me'.[402] The disingenuous self-sacrifice and self-aggrandisement on the part of Harlow suggests that in order to assure the future of love, touch, and intimacy as a scientifically validated behaviour, he must give them up himself. This is coupled with a sense of misogynistic misanthropy in his regard of the student and other female colleagues he encounters, as well as a blatant arrogance in his premature application of knowledge gained from his empirical investigations. Certainly, for Harlow what is true for his detained female rhesus macaques under examination is true of all females across all species. His detached and observational tone is reminiscent of the female macaque observed in the experimentation earlier. Harlow's empirically succinct interpretations

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[398] *Ibid.*

[399] *Ibid.*, p. 102

[400] *Ibid.*, p. 101.

[401] *Ibid.*, p. 94.

[402] *Ibid.*, p. 100.

of obvious displays of care and concern during these interactions throughout Harlow's internal narrative is Millet's proposition that something *must* affect the researcher during encounters that look to deny such fundamental emotions. In doing so, Millet prompts a consideration and comparison between Harlow's eventual results presented in the scientific vernacular and his actual, intimate personal experiences. Essentially, her point is that although the scientific method exalts a methodology that ensures the elimination of variables that would contaminate subject and findings, there is an element of contamination that moves in the *opposite* direction: a subliminal two-way affective encounter. What this means in terms of the representation of non-human animals in the experimental scientific setting is the potential to rebalance systems of autonomy during human and non-human encounters: a way that fictional reconstructions can work against and negotiate around empirical systems that otherwise look to *quieten* non-human animal presences through methodological approaches of separation and isolation.

Anecdote, the Articulation of Bodies and Affective Encounters

In 'The Body We Care For: Figures of the Anthropo-zoo-genesis', Despret puts forward the notion of unnoticed behavioural by-produce occurring during and between empirical encounters in the experimental setting; unprioritized and unused by investigators. A brief outline of this conceptual approach will enable an identification and evaluation of how these same subliminal forms of encounter and exchange are explored and attributed value in the three literary texts. Referring to bodily encounters, Despret suggests that both human and non-human animal 'are cause and effect of each other's movements. Both induce and are induced, affect and are affected'.[403] She then goes on to examine how human and non-human animal bodies 'articulate'[404] to one another, and articulations can be read if investigative entities remain 'available' or open during encounters.[405] Though Despret's conceptual approach encourages the potential for other modes of interactions between researcher and non-human animal subject in this epistemological environment, it also reemphasizes a key problem for Millet. How can fictional representations of human and non-human animals in the scientific space look to explore notions of affection, wholly reliant on bodily encounters, when the fundamental basis of the empirical

[403] Despret, 'The Body We Care For', p. 115.

[404] *Ibid.*, p. 117.

[405] *Ibid.*, p. 122.

investigation relies absolutely on their absence through systems of separation? Millet achieves this in two ways: the first being Harlow's awkward foray into the social realm at the faculty party to depict the emotive consequences of his research, and the second culminating in the nightmare sequence toward the end of the story. In regard to Despret's articulation of bodies, it would seem Millet's narrative strategy threatens to omit the non-human animal presences entirely, but it actually renegotiates the realities of their solitary confinement, or bodily distance, and provokes a reconsideration of their quotidian experience. Through such a strategy, Millet can free both Harlow and the rhesus macaques of the temporal and methodological trappings of the laboratory and experimentations.

Millet's narrative proposes that aspects of Harlow's empirical experimentation, and thus the experience of the rhesus macaques, *could* have affected or been transferred to him subliminally. Intriguingly, there is evidence of these affective encounters and articulations of bodies in Harlow's personal writings and is especially apparent in his article 'The Monkey as Psychological Subject', a retrospective on the choice of the rhesus macaque as his experimental non-human animal subject. In the article Harlow recalls 'the finest animal in the collection […] a 13-year old, almost unbelievably tame and gentle orangutan, Jiggs'.[406] Harlow describes Jiggs as 'calm and deliberate, and he took his work seriously', a clearly anthropomorphised recollection.[407] Harlow recalls a tool-using cebus monkey named Murphy, describing 'an unusually tame and affectionate little monkey who bit only women and children'.[408] Of these recollections, Harlow notes that '[o]ne can, of course, question the validity of the report because it is not substantiated by objective record other than written word'.[409] Herein lies the limitation of the value Harlow attributes to anecdotal evidence, as any unscientific documentation of these supplementary non-human animal behaviours would have been 'a matter of grave risk to the reputation of any ambitious young scientist'.[410] Harlow admits to the conscious omission of anecdotal evidence, disregarded due to science's methodological terms of conduct. This demonstrates a conscious decision that knowingly or unknowingly directs empirical research trends and the particular knowledges they produce in one particular direction whilst turning from or repudiating another;

[406] Harlow, 'The Monkey as Psychological Subject', p. 339.

[407] *Ibid*.

[408] *Ibid.*, p. 340.

[409] *Ibid.*

[410] *Ibid.*

prompting a broader consideration of the nature of the non-human animals experience within this epistemological environment.

Later in the article, Harlow recalls 'an adult spider monkey, Grandma […] the only animal with a tail that could think'.[411] He outlines Grandma's constant curiosity, as well as the unprecedented use of her tail to complete and solve tasks; he continues:

> But there is an even more remarkable tale about Grandma. High above her indoor living cage and obviously out of arm's reach was an electric light with a pull chain, and Grandma used to wile away the evening hours by grasping the chain with her tail and turning the light on and off […] [the night watchman} rushed upstairs to catch the intruder, and the light downstairs went on. He rushed downstairs and the light was off – and no one was there […] [t]he watchman had had enough, but Grandma continued to always be curious.[412]

Though littered with Harlow's trademark sarcasm, the extract provides a genuine glimpse into the experience of the non-human animal; it describes an interactive encounter occurring outside of the recorded parameters of a scientific observation. The episode remains forever anecdotal, written down and published after Harlow had achieved his fame and status, his anthropomorphic indulgences now of little to no risk to his professional reputation. Harlow does not elaborate on Grandma's behaviour, never considering her actions to be incited by boredom, fear, anger, or even perhaps desperation. Nevertheless, she still exists in these anecdotal moments along with other non-human animal presences. Nevertheless, Harlow eventually determines that rhesus macaques 'are almost devoid of personality, in the common sense meaning of the term'.[413] Harlow's scientific objectivism ultimately triumphs and explanations for his appropriation of the rhesus macaque into his comparative psychological experiments for over twenty years are made apparent.

Millet's fictional reincarnation of Harlow includes comparable subliminal moments of affective encounter to force a consideration of what it takes to carry out empirical investigations

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[411] *Ibid.*, p. 341.

[412] Harlow, 'The Monkey as Psychological Subject', p. 341.

[413] *Ibid.*, p. 343.

so devoid of positive emotive reassurances. Millet's fictional adaptation of Harlow is perhaps idealistically hopeful that something *did* affect him, but equally prompts readers to consider how such deconstructive experimentations *could not* affect the one conducting them. Millet's reconstruction guarantees Harlow is never denoted as the standard emotive response, depicted through his social imbalance and obsessive cognitive mannerisms. As shown in the party sequence, Millet's narrative blurs the boundaries between the laboratory and social world to insinuate there is a psychological cost paid by Harlow as he deconstructs the emotions of love and affection in such a seemingly detached or empirical way. Though Harlow's methodology may seem empirically sound to him and himself seem appropriately removed, Millet suggests that the empirical procedure *must* contain moments of affect and emotional exchange; such is the nature of such drastic experimentations. During the emotive climax of the story, Millet employs a dream sequence in which the powerful, universally emotive symbol of "the mother" visits Harlow in a reoccurring nightmare. Having occupied Harlow's consciousness for most of the narrative to this point, Millet employs a singular representation once again, this time being the image of the mother and the infant. This strategy enables Millet to simultaneously embody *all* of the non-human animal subjects in Harlow's experimentations, both past and present, and personify abstract concepts of maternal care and affection. Such a strategy removes the temporal implications of the scientific environment being deliberated and moves the encounter to the metaphysical space of Harlow's dream where active epistemological logics that situate researcher and non-human animal subject are dissolved in order to be then reconsidered.

Harlow returns to the laboratory and finds the young female rhesus monkey no longer trying to escape, instead it is a '[h]unched little figure, staring. Nothing there. It had gone'.[414] Millet's narrative then shifts into the third-person omniscient as Harlow falls into the reoccurring, alcohol-fuelled nightmare. The pragmatic and punctuational undertones that characterise the narrative up to this point are replaced by a more extended and visceral style, mirroring the liberation from empirical systems and Harlow's empirical tendencies. However, even in his subconscious Harlow at first struggles to process the non-empirical implications of the dream:

> In the nightmare, which he'd had in other forms before, he stood beside his beautiful boxes, the boxes of his own design […] He mistook each infant monkey for a beloved soul. In that way the nightmare was confusing. He saw each infant in the heart of its

[414] Millet, 'Love in Infant Monkeys', p. 104.

> mother, precious, unique, held so close because the mother was willing to die for it.[415]

The extract demonstrates an expression of internal guilt in a subconscious form, a somewhat conventional premise in its fictional exploration into the potential for *unconscious* psychological effects as a result of conversely *conscious*, rational scientific behaviours. Harlow's rational scientific mind is still present in habitual form, demonstrated by the egotistical mention of his "beautiful boxes" and his mistaking or confusing the infant rhesus macaques as uniquely and emotionally precious. Similarly, the spectres that visit him are continuously referred to as "the infant" and "the mother", still named according to their role within his experimentations. However, outside of the temporal reality of the laboratory space, the mother and infant are reunited and the affective intensity of the narrative increases as the maternal bond between mother and infant is reconstructed and restored only to be ruined again. Millet's literary strategy works in the opposite way than key empirical processes Despret interprets Harlow's research to rely on, that '[t]his experiment of separation does not stop with separating beings from one another but consists in destroying, dismembering, and, above all, removing'.[416] Rather than accentuate the same deconstructive processes outlined by Despret, Millet actively works against them to *restore* what was lost during the experimental investigation.

Millet transposes the temporal logics of the scientific setting in the narrative, causing Harlow's experimentations to become the traumatic event within the chronology of both the mother and infant's lifetime, rather than being subjects existing within the linear temporalities of the investigation. Subsequently, perspectives of Harlow's experimentations change as it becomes the *cause* of the emotional distresses under observation. The traumatic experiences of mother and infant are portrayed as being due to something being *lost*, something that now exists and existed before the logics of the investigation and not artificially prevented as Harlow would like to believe. Despret's conceptual approaches supports this notion, as Harlow's only concern is to use the infant rhesus monkey 'in order to measure the effects of an apparatus designed to create despair'.[417] Millet inverts the terms of the experiment fictionally, displacing mother and infant out of the laboratory's jurisdiction into the metaphysical dream sequence. By dissolving the

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[415] *Ibid.*, pp. 104-105.

[416] Despret, *What Would Animals Say*, p. 149.

[417] Despret, 'The Body We Care For', p. 123.

epistemological logics of the laboratory space, Millet encourages the reader to reinterpret the abstract terms "mother" and "infant" in closer accordance with their own understanding of maternal bonds between human mothers and their infants; rather than the detached demarcations presented by Harlow's narrative and regiment scientific empiricism.

The physical constraints of the laboratory space are also delimited during the dream sequence, modifying systems of separation and the proximity of bodies. Harlow no longer looks *down* on the rhesus monkeys without them knowing he is there, instead he now *faces* the mother who is 'fully aware of what was happening to her and her baby'.[418] Harlow observes:

> In the nightmare it was always the mother monkey he faced, not the infants. The mother, with her wild, desperate eyes. He felt what he could think of only as her passion, like a heat emanating. The mother was crazy with love, mad with a singular devotion. All she wanted was the safety of her infant. She would chew off her feet for it. She would do anything […] When he took the baby from her arms, her panic rose so high it could rise no higher; if she knew how to beg she would beg till the end of the world, scream until her throat split. *Give me my baby back.*[419]

For Harlow the mother is now an unsettling presence that exists beyond the actualities of the investigation and is synonymous with the infant. The narrative shift is catalysed by the visceral reactions of the mother's separation fundamentally affective and emotionally reactive, disarming Harlow of his empirical behaviours. Through creating the nightmare sequence Millet's fictional strategy allows for the construction of a scenario where Harlow is no longer bound or authoritatively reaffirmed by the empiricism of the laboratory space. There is a deliberate narrative shift toward emotiveness, as Harlow struggles to comprehend both the intensity and variety of emotions felt by what he refers to as the mother's "passion". Harlow no longer translates the mother's instinctive responses but *feels* them; no longer conjecturing but instead *knowing* that simply '[s]he would do anything'.[420]

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[418] Millet, p. 105.

[419] *Ibid.*

[420] *Ibid.*

Millet's fictional strategy corelates closely with the conceptual approach of Despret's 'theory of emotions', which argues that value exists in emotional responses during encounters in empirical spaces.[421] Despret challenges the ambiguous interpretation or cautionary consideration of emotions in terms of scientific value, surmising that '[a]n emotion is not what is felt but what makes us feel'.[422] Millet demonstrates these same implications through the affecting depiction of the screaming mother. Despret suggests scientific attempts to *define* emotions are 'on the one hand assuming they explain how the world affects the mind, and on the other hand, how the mind affects or construes the world'.[423] Despret proposes that the role of emotive responses, or affective behaviours, should be legitimately considered during human and non-human animal encounters *because of* the potentialities that they complicate. At the end of the story, Millet's narrative returns to Harlow's psyche to offer a final consideration of the nightmare sequence and the mother's affective distress and turmoil; Harlow himself recognising that he 'knew the feeling of loss that would last till she died. He knew it the way he knew a distant country. They had their own customs there'.[424] Harlow is apparently reaffirmed as the unaffected and disaffected outcast returning to the familiar territory of scientific pragmatism. However, the imagery employed in these last two lines completely transposes Harlow's position from being simply consciously disregarding of emotive behaviours or affective responses, to someone who is completely incapable of empathy entirely. The inference laid out suggests that Harlow has experienced past trauma, but his determination to understand or produce knowledges regarding complex and multifaceted concepts such as love, isolation, and despair ultimately make them unobtainable. When considered altogether, Millet's narrative proposes a fundamental paradox in Harlow's endeavour: the closer he comes to knowing emotions in empirical or scientific terms, the further away he gets from being able to delineate and understand them emotively himself.

Within the broader argument of this chapter, the importance of Millet's fictional speculation of Harlow's experimentations into isolation and depression as well as their projected consequence on his own psychological state lies in its particular strategic approach toward issues of temporality, autonomy, and systems of separation that characterise experimental researches. Millet offers an approach that negotiates the practicalities of multi-subject non-human animal

[421] Despret, 'The Body We Care For', p. 125.

[422] *Ibid.*, p. 127.

[423] *Ibid.*, p. 126.

[424] Millet, p.105.

experimentations to rebalance these epistemological systems enforced through experimental methodological design, exploring other means of valuable interspecies communications that occur during encounters to frame her literary reconsiderations. However, there remain other issues of autonomy that are unaddressed by Millet, her primary focus being systems of autonomy relevant to the physical experimental setting and methodological apparatus that dictate non-human animal's corporeal situation. Further conceptual considerations pertaining to issues of autonomy involve scientific empiricism more broadly, including its treatment of different *kinds* of non-human animals appropriated for experimental researches. These different issues of autonomy are intrinsically linked to another key epistemological feature of the experimental setting: the logic of value. Karen Joy Fowler's 'Us' and Ursula Le Guin's 'Mazes' are two other fictional examples that are more interested in these other epistemological concepts. Together with the fictional contributions of Millet's 'Love in Infant Monkeys', an analysis of these two texts will form a more comprehensive overview of non-human animal experience in the experimental setting and a more complete consideration of key epistemological logics at work there.

Literary Strategies: Karen Joy Fowler's 'Us' and Ursula Le Guin's 'Mazes'

Karen Joy Fowler's 'Us' offers a particular literary strategy by which to reconsider the non-human animal in this epistemological space, focusing particularly on the perennial use of rats in human scientific research. Fowler's short story takes form of a narrated historiography of human-rat encounters, opposing the rats' collective narrative '*we*' and '*our*' referring to the '*you*' and '*your*' of the human race. This stylistic technique enforces a sense of species distance in the narrative, despite the bodily proximities of researcher and non-human animal subject. Here, Fowler's technique acts to fictionally *reinforce* species lines in such a way that allows for an eventual reconsideration of their existence and continued maintenance. Through this, Fowler is able to emphasise anthropocentric characteristics of empirical approaches and their use and treatment of non-human animals to question why systems of separation and demarcation are so dogmatically upheld. Therefore, the narrative allegorically traverses the entirety of human-rat history in order to weigh it against the utilisation of rats for modes of empirical investigation and consider its future direction. Fowler presents the two histories as indivisible from one another, stating '[w]e're in this together, always have been'.[425] Certainly, historian Jonathan Burt reiterates

[425] Karen Joy Fowler, 'Us', *American Quarterly*, 65 (2013), 481-485 (p. 481).

the authenticity behind Fowler's approach, noting '[the rat's] significance goes beyond its ranking and is out of proportion to its size. The rat is, as some writers have phrased it, a twin of the human, and their mutual history is dark'.[426] Fowler's dual-species narrative is therefore not an overly unique consideration, but implemented fictionally it encourages a reconsideration of wider ethical implications pertaining to such widespread use of rats throughout history and subsequently in empirical designs today.

Certainly, as with Millet's portrayal of Harlow's infant rhesus monkeys, an extended fictional representation of an individual rat would not effectively encapsulate the entirety of the non-human animal experience or all the forms of encounter effectively in this environment. Again, implications include issues of temporality and are intrinsically tied up with logics of value; concepts particularly poignant in short-term empirical investigations as Fowler concisely paraphrases: 'our job is to sicken and die, but only in useful ways'.[427] In Fowler's narrative, the temporal logics specific to this form of scientific investigation are removed, leaving her free to present a broader view of human and non-human animal encounters in this epistemological setting. She moves past the temporal confines of the *too short* short-term experiment, beyond the limited lifespan of the non-human animal and chooses the *historical*; the life history of a species. In doing so, Fowler can highlight and directly question empirical motives, the paradigms that scientific investigation using rats looks to challenge and replace, as well as our overarching relationship with a species whose very existence has been appropriated by the terms of its usefulness. However, does such a narrative strategy threaten to in fact *overgeneralise* the experiences of the individual non-human animal in favour of prioritising reconsiderations of the cultural or scientific movement in question? In the case of Fowler's narrative, it would suggest yes, that the importance and meaningfulness of the rat is gleaned from historical shifts throughout the species history, rather than considerations of the individual non-human animal. It is therefore beneficial to compare Fowler's with another fictional strategy, one that employs a narrative favouring the individual non-human animal, to explore how the two different approaches negotiate issues inherent to short-term, multi-subject experimentations.

Ursula Le Guin's 'Mazes' is another short story told from the perspective of a single laboratory rat employed in a variation of cognitive behavioural experiments. The first-person

[426] Jonathan Burt, *Rat* (London: Reaktion Books, 2006), p. 7.

[427] Fowler, 'Us', p. 485.

narrative finds its narrator considering the behaviour and actions of the experimenter who is blatantly human but referred to throughout as the "alien" or "creature" whose 'elaborately perverse cruelty marks all its behaviour'.[428] The narrative involves a series of recollections by the non-human animal narrator, now on the verge of death due to human negligence regarding its nutrition and being repeatedly put through a series of empirical tests and apparatus; particularly a maze run. The narrative contains a semi-anthropological quality, culminating in a sense of both cultural distance and of missed opportunities for communication and interaction; a mistranslation during an articulation of bodies between two species potently reminiscent of Despret's bodily articulation approach. The story culminates in one last attempt on the part of the narrator to communicate through bodily cues, during a moment outside and away from empirical tests and scientific apparatus. In this moment, the rat recalls '[t]here were no words, yet there was communication […] It told me it was sick of torturing me, and wanted me to help it […] But I was too weak to speak clearly, and it did not understand. It has never understood'.[429] The misinterpretations are anticipated to continue even after the narrator's death, as '[n]o doubt [the experimenter] will come in to watch me die; but it will not understand the dance I dance in dying'.[430] Le Guin's rat never achieves any kind of communication, such is the inflexible nature of scientific observation portrayed in the story. Like Fowler, Le Guin's alternative fictional strategy looks to negotiate issues of literary representation specific to the non-human animal in short-term empirical investigations, though through an entirely different strategy.

Le Guin's singular, first-person narrative approach is seemingly the complete opposite to Fowler's collective consciousness yet both strategies offer unique advantages in their representation of the non-human animal. Le Guin forms a sense of close proximity between human and non-human animal bodies, against which she then proposes lost potential in moments due to the obliviousness of scientific observation regarding anything outside empirical methodology and hypothesis. Whilst Fowler, through taking a broader view of the human and non-human animal relationship concerning scientific use of the rat genus, seemingly moves away from the bodily intimacies of the laboratory. Instead, Fowler allows for the consideration and evaluation of wider-ranging empirical priorities by including both a mutual historiography and

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[428] Usula Le Guin, 'Mazes', in *The Unreal & The Real Volume 2: Outer Space, Inner Lands* (London: Gollancz, 2014), p. 57.

[429] *Ibid.*, p. 61.

[430] *Ibid.*

projected future, against which the present treatment of rats can be evaluated by the reader. However, despite these different techniques, both narrative strategies include a sense of deliberate distance installed between investigator and subject: Fowler's "you" and Le Guin's "alien" or "creature". Both approaches treat the human as something *other* and ultimately unreachable, resulting in a stylistic approach that encourages a feeling of anthropological strangeness.

The Logics of Value and Issues of Autonomy

As stated, Fowler and Le Guin's inclusion of rats in the laboratory space raises a key conceptual consideration unique to short-term experimentation regarding the smaller, more readily available non-human animals: the logic of value. Experimental non-human animal subjects such as monkeys, pigeons, mice, and rats are not prone to the same restrictions as other larger specimen like chimpanzees, certainly in terms of availability. Logistical advantages regarding housing, feeding, and financial costs appeal to investigators, particularly those constantly altering hypotheses and methodologies, requiring a numerous and constant stream of non-human animals. Additionally, the categories of smaller non-human animals are subject to different, less stringent levels of legislative protections within the laboratory space, falling within a demarcation of ethical and moral consideration and treatment determined appropriate to their species classifications. This therefore renders the subject pool potentially infinite, as there is no finite resource dependent on access to certain, expensive, and remote non-human animal populations. In comparative developmental psychology, investigations continue beyond the lifespan of individual non-human animal subjects. Instead, results are gleaned from a collective of less-durable, shorter-lived contributors. These nuances in empirical logics of value reemphasize the fundamental conceptual opposition between different models of knowledge production of non-human animal life in the laboratory. Long-term, single-animal studies value the animal more as investigations are appropriated chronologically into the lifespan of the subject according to learned behaviours and cognitive development; one non-human animal subject tests multiple hypotheses to produce multiple results. Conversely, the short-term, multi-animal investigations value the non-human animal *differently* as multiple research subjects contribute to a collective sample; multiple non-human animal subjects test one hypothesis, with one set of results.

The logics of value introduce the notion that sub-fields of empirical science treat the non-human animal as *objects* of the experiments rather than *subjects* of the experiments, a key conceptual opposition. This is intrinsically tied together with issues of autonomy, though the level of independence that this term insinuates are decidedly relative as it is impossible for non-human animals to ever enjoy full independence in this setting. That said, what levels of autonomy *are* permitted to the animals in these different settings? Primate language studies require a two-way system of information transfer between the human researcher and non-human animal subject. Employing interspecies teaching and learning of linguistics and symbology to proceed toward the research goal. A level of autonomy therefore rests with the non-human animal subject for the production of knowledge to occur. Other more exploratory modes of research, such as investigations into brain trauma for instance, have no such reliance on approaches of cooperation; actions are performed by the scientist *on* the non-human animal subject. Here autonomy remains solely with the human; the scientist applies the stimuli, through direct physical action or alteration of environment, and then observes the results. Taking these two particular examples into consideration, the chimpanzee subjects in the language experiment have greater autonomy, as they are the less objectified in comparison to those in the trauma studies. Again, this is a paradoxical consideration, as the chimpanzees are still charged with the task of learning, reciprocating, and influenced by species-specific notions of scientific and financial value. How then do Fowler and Le Guin represent the laboratory rat, whose role in the annals of science is most certainly as *object* and not subject, in such a way that rebalances these systems of value and autonomy to provoke an effective fictional reconsideration in this setting?

Fowler's narrative begins with an historical evocation of a past when human culture accepted rather than abhorred rats, emphasizing appropriations according to dominant social paradigms. Burt highlights that general attitudes toward the rat shifted alongside advances in human expansion to become 'symbolically refashioned in the nineteenth century as it threatened the new thresholds of cleanliness that accompanied the building of sewers and other sanitary and medical advances. As rats came up out of the sewers, they were a visible embodiment of the filth that society was placing out of sight'.[431] To achieve this sense of shift, Fowler's rats possess a collective memory, recalling a time when '[y]ou thought we brought you luck, called us clever, resourceful, and resilient […] Inquisitive, industrious'.[432] Fowler employs a *paraphysical* fictional

[431] Burt, p. 39.

[432] Fowler, 'Us', p. 481.

strategy, wholly different from Millet's use of the metaphysical unconscious in the form Harlow's dream sequence. The collective dynamic of Fowler's narrative promotes the use of memory, a mental process excluded from or inexplicable by conventional scientific psychology. Fowler's stylistic strategy moves the narrative away from the domain of the empirical, allowing for a discussion of scientific processes without systems of lineal temporality or other logics that the laboratory space would otherwise dictate. At the same time, Fowler is then able to navigate the multiplicity of roles played by rats in the empirical sciences throughout its history, better capturing the multifaceted nature of their involvement that accommodates the fact that it is 'almost impossible to get a summary overview on the countless experiments carried out with rats in the twentieth century'.[433] By resorting to the medium of historiography, Fowler not only reiterates the scale of use, but also the human cultural shifts that appropriated those uses; as Burt highlights, 'almost all experience of the rat is mediated through particular cultural responses to it […] [including] elements that make up the scientific construction of the rat'.[434] Intriguingly, Fowler does not indulge in historiographical vernacular, but instead uses the form as a frame on which to build her fictional narrative.

The narrative then mirrors the change in human attitudes toward the rat, as Fowler's rats consider '[w]e've learned that it's best to please you. You like us tame better than wild, docile better than savage […] but not in the sewers […] you want us to look as little like the rats that carried the plague as possible. Those rats are still in your nightmares'.[435] The story maps out the shared diasporic migrations of both human and rat species, with rats thriving 'on those areas of human activity which are themselves deemed to be the most problematic, such as war and imperialism'.[436] Fowler prompts a consideration of mutual human-rat experiences, these being the devastations of disease, domestication, production of scientific knowledge, and implicating the potentialities of human-rat encounters. Fowler's consideration of the modern-day human-rat relationship finds the laboratory become the narrative setting; playing host to inter-species encounters. Indeed, Fowler's rats are acutely aware of their uses and knowingly look to ensure the future of their species by consciously fulfilling their expectations:

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[433] Burt, p. 105.

[434] *Ibid.*, p. 114.

[435] Fowler, 'Us', p. 483.

[436] Burt, p. 13.

> You like us fast and clever in mazes, but not in the sewers. We like the dark, but you don't so we've learned to sleep in the light […] We don't bring disease. We fight it. Now we are your partners in the great and final battle on the frontiers of medical progress.[437]

Yet again, the collective consciousness in Fowler's narrative allows for a broader reconsideration of the non-human animal experience in short-term experimental sciences. Fowler places modern empirical treatments within the timeline of the rat genus, forever being appropriated and re-appropriated for use in scientific investigations. This encourages the reader to look beyond the individual laboratory rat and consider the moral and ethical dilemmas now applicable to an entire species and observe the paradoxes apparent in the hypotheses tested. For example, Fowler's rats consider, '[o]ur desire to please you has wreaked havoc with your data, which displeases you. You prefer data to animals. This is a maze with only one way through'.[438]

Reincarnations of the Laboratory Rat

Undoubtedly, rats have played an immeasurable part in the progression of science; a perennial presence throughout its history right from its earliest point of genesis. The use of rats correlated with their domestication throughout the eighteenth century for social activities such as rat-baiting and as fashionable pets. This drastically increased accessibility and, coupled with selective breeding of particular species characteristics, cemented the role of the laboratory rat throughout the next century. Rats became widely available, which in turn also secured the survival of domestic populations; as Fowler aptly comments, '[d]omesticity works both ways'.[439] Referring to the multiapplication of rats in the empirical sciences, Burt notes:

> Science treats the rat as vermin but also presents it as the hero/heroine of science (perhaps we should say that the former enables the latter). This is a long history of victimhood, doomed heroism or martyrdom: the rat has been dissected, vivisected, electrocuted, given diseases, drowned, genetically manipulated, controlled at a

[437] Fowler, 'Us', p. 483.

[438] *Ibid.*

[439] *Ibid.*, p. 482.

> distance by radio signals, and sent into outer space […] [if] the rat shadows the human, in science this is much more tightly conceived substitution […] the rat has to be created, or recreated, by science. The commonplace that the rat is an ideal experimental animal contains within it the fact that science has created this ideal, while in turn also constructing itself, literally so in the case of laboratory equipment and housing, around its creation.[440]

Burt proposes the continuous creation and recreation of the "rat", constantly appropriated and re-appropriated into the episodic methodological paradigms of the empirical sciences. This feature is included in Fowler's narrative, as '[rats] have become data. Our path is standardized breeding, standardized handling. Genetic variation has been minimised'.[441] More specifically, rats have made innumerable and immeasurable contributions to empirical discoveries throughout almost all sectors of human science; including neuroscience, cardiovascular medicine, transplantation, genetics, nutrition, virology, effective treatments for diabetes, parasitic infections, and cognitive behaviour to name but a few. Since 1901, of the 106 Nobel Prizes awarded for Physiology or Medicine, 31 investigations relied on rats to conduct research and create data.[442] These alone consist of ground-breaking discoveries into human conditions, notably the treatment of tuberculosis, identification of carcinomas, adrenal hormones, regulation of cholesterol metabolism, signal transmission in the nervous system and development of MRI image generation.[443]

Today, technological advancements in genetics mean that laboratory rats are now eugenically modified for key physiological features. For instance, the artificiality created sub-species of Zucker fatty rat is used as a genetic model for obesity and hypertension[444] or the Royal College of Surgeons rat which is used as a classic model of recessively inherited retinal

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[440] Burt, p. 89.

[441] Fowler, 'Us', p. 484.

[442] The Nobel Prize, 'All Nobel Prizes in Physiology or Medicine' (Nobel Media, 2018) <https://www.nobelprize.org/prizes/uncategorized/all-nobel-laureates-in-physiology-or-medicine/> [accessed 27 September 2018]

[443] *Ibid.*

[444] T. W. Kurtz, R. C. Morris, and H. A. Pershadsingh, 'The Zucker fatty rat as a genetic model of obesity and hypertension', *Hypertension*, 13 (1989), 896-901.

degeneration.[445] These synthetic sub-species are the result of the creation of 'a variety of genetic stocks' from which scientists can select the ideal subject.[446] More recently, on 1st April 2004, the complete genetic sequence of the Brown Norway rat was presented to the scientific community, with which scientists could isolate, remove, or replace selected genomes to produce a perfect laboratory rat by which to test specific hypotheses; known today as knockout rats.[447] These are most well known for their uses in stem cell researches today. The rat has been used in empirical investigations for over two hundred years, to such an extent that they are now synonymous with science and the laboratory in the public imagination.

Accordingly, the modern-day rats featured in Fowler's narrative become biologically altered by humans; as 'the more of your DNA we carry, the more fragile we are. Your filthy presence threatens us with fatal infections. We hope you see the irony'.[448] Fowler moves from the intertwining of the historiographical to the biological in order to question the accountability of science, portraying a futuristic, symbiotic fusion of two species, or 'team players […] surrogates', that blur biological lines in order to fulfil the promissory that '[s]omeday we'll save you from disease and maybe, finally, from death itself'.[449] Fowler's narrative approach prompts a consideration of the broader epistemological implications at play and the empirical motivations that guide the use of non-human animals in research. Fowler's modern, scientifically ideal rat is 'The International Genetic Standard Rat' whose '[g]enetic variation has been minimized in the attempt to eradicate the noise of individual personality. The ideal laboratory rat is an apparatus in today's modern lab, a test tube'.[450] By presenting the story in this way, an interconnected history of two species, Fowler looks to propose a reconsideration regarding the fundamental reasons for scientific research. Indeed, this is highlighted early in the story as Fowler's narrators observe a characteristic of human empirical approaches, '[n]o one else so often mistakes a mirror

[445] Patricia M. D'Cruz et al, 'Mutation of the receptor tyrosine kinase gene Mertk in the retinal dystrophic RCS rat', *Human Molecular Genetics*, 9 (March, 2000), 645-651.

[446] Philip M. Iannaccone, and Howard J. Jacob, 'Rats!', *Disease Models and Mechanisms*, 2 (May, 2009), 206-210 (p. 206).

[447] Rat Genome Sequencing Project Consortium, 'Genome Sequence of the Brown Norway rat yields insights into mammalian evolution', *Nature*, 428 (2004), 493-521.

[448] Fowler, 'Us', p. 485.

[449] *Ibid.*

[450] *Ibid.*, p. 484.

for a window'.[451] This consideration allows for a wider-reaching and all-encompassing view of the treatment of rats as a species and questions the direction of both current and future empirical investigations.

The Reciprocation of Bodies: Empirical Selectivity and Missed Opportunities

In both Fowler and Le Guin's stories, reasons for the sense of species distance are given to be the empiricism of the sciences. The blinkered view of scientific protocol and practice ultimately dictate and restrict opportunities for other modes of producing knowledge concerning non-human animal life, as well as the nature of encounters and exchanges. For instance, Le Guin's rat recalls:

> So when I was taken up and put down, amidst all this strangeness, in a maze […] it was a moment of strength and hope […] It seemed pretty clear that I had been put in the maze as a kind of test of investigation, that a first approach toward communication was being attempted. I tried to cooperate in every way. But it was not possible to believe for very long that the creature's purpose was to achieve communication.[452]

This passage resonates with a conceptual approach put forward by Despret, who proposes all non-human animals under investigation 'must still solve [the trial] in the terms that interest the researchers'.[453] Certainly, the single purpose of the maze is to test how quickly the rat can move through it; an ability requiring a level of intelligence deemed to be important by the operating hypothesis of the investigation and tested through what is considered to be an empirically sound method. During this empirical investigation, supplementary behaviours are deemed irrelevant or invaluable so long as they do not contribute to either securing or displacing current scientific paradigms concerning navigation abilities in rats. Despret's consideration subverts the conditions of the empirical investigation in order to reprioritise the experience and *uninterest* of the non-human animal. Despret instead poses the emblematic question '[w]hat are rats interested in

[451] *Ibid.,* p. 481.

[452] Le Guin, p. 72.

[453] Despret, *What Would Animals Say*, p. 93.

during experiments?'.[454] Accordingly, Fowler's rats note '[t]he walls of our world are opaque, because you don't like it when we look at you […] In your eternal light, we ask ourselves philosophical questions. What happens next? […] What are you like in the wild?'.[455] Like Le Guin, Fowler's narrative reemphasizes the artificiality of the experimental laboratory space and the prescribed nature of encounters that occur there. Both narratives are built around the notion that not only does the laboratory exalt systems of control over internal and external variables, but it also mandates a particular mindset pertaining to the extraction of knowledge and this extraction only happens in particular ways.

Despret supports this suggestion in her examinations of an experiment conducted by Robert Rosenthal on students working with rats in the laboratory space, where artificially placed preconceptions of a student's rat subject suggested they had been bred for either 'brightness' or 'dullness'.[456] The students' preconceived biases subsequently affected student expectations and influenced the scientific data produced. Despret takes Rosenthal's observational findings further, proposing a two-way interaction in fact takes place here:

> [The students] put their trust in their rats, emotional trust, trust that is conveyed in gestures, in students' bodies, in all these rats' bodies that were manipulated, caressed, handled. Fed and encouraged: the students succeeded in attuning their rats to their beliefs […] these beliefs brought into existence new identities for the students and for the rats […] this practice proposes new ways to behave, new identities, it transforms both the scientist and the rat.[457]

Despret is suggesting that scientific empirical systems effectively produce the same truth that they seek to find, though occurring at the level of bodies and identities. This is something that Fowler includes in her fictional reconstruction; an existent mutual regard and reciprocation of bodily responses. Fowler's rats notice the scientific tendency toward refutation and conjecture, or '[v]icarious trial and error (VTE) is what you called the hesitant, looking-about behaviours we

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[454] *Ibid.*, p. 89.

[455] Fowler, 'Us', p. 20.

[456] Robert Rosenthal, 'On the social psychology of the psychological experiment: the experimenter's hypothesis as unintended determinant of experimental results', *American Scientist*, 51 (June, 1963), 268-283 (p. 270).

[457] Despret, 'The Body We Care For', p. 122.

evidence before moments of decision'.[458] Fowler evidences the Rosenthal effect in her narrative strategy, through the inclusion of a rat strain determined to be psychological: '[t]ell a student he has a Berkeley rat, and whoever he has will try to perform accordingly. While you were noting our VTEs, we were noting yours'.[459] Here, Fowler proposes the inter-species reciprocation of behaviours; the generation of learned habits through repetition and repeated practice, the result of mutual cohabitation and environmental interactions.

Fowler removes the epistemological restrictions of a one-way empirical system to consider what is being learned by *both* human and non-human animal participants. She elaborates: '[w]e prided ourselves on our performance, our abilities, our discipline. Now recent studies suggest that the single factor most predictive of our success is you'.[460] Completing her critique of scientific methodology, Fowler's rats query the same favourability toward the maze as a scientific measurement tool, '[i]t surprises us that, among your many sporting events, you don't include the mazes; you seem to be such enthusiasts'.[461] Again, this emphasizes the artificiality of the apparatus and exaltation of particular intelligence and behavioural criteria over others; reemphasizing a sense of performance during time within the maze and a disregard for moments outside it. Fowler condenses linear temporalities concerning the history of the maze experiment to implicate and question scientific methods of knowledge production more broadly:

> For years there was evidence, unscientific and anecdotal […] you said the rats had no interest in the mazes. They responded only to food cues […] Later, we could be set back inside at any random point and still find our way easily. You began to talk about our cognitive maps, the scientific ways in which we worked, as if we were testing out hypotheses.[462]

However, between researcher and subject, and between bodies, Despret proposes there exists the 'cause and effect of each other's movements. Both induce and are induced, affect and are

[458] Fowler, 'Us', p. 483.

[459] *Ibid*.

[460] *Ibid*.

[461] *Ibid*.

[462] *Ibid*.

affected'.[463] The blatant frustration of Le Guin's rat is born from the experimenter's permanent predisposition toward intelligences that are deemed to be scientifically important and are only empirically discernible: the intelligence to move through the maze successfully. Subsequently, the rat's other kinds of intelligences go completely unnoticed or are wholly misinterpreted, occurring outside the observational parameters of empirical testing. In Le Guin's narrative, these systems are juxtaposed and exaggerated by the corporeal closeness and proximities between human and non-human animal bodies; as the rat considers: '[t]he alien has never once attempted to talk with me. It has been with me, watched me, touched me, handled me, for days: but all its motions have been purposeful, not communicative […] totally self-absorbed'.[464] Such a literary strategy therefore challenges scientific methodologies that promote separation to consider whether even brief moments of proximity between bodies can truly exist without moments of value or affective exchange during interspecies interactions.

Conclusion

The objective of this chapter was to analyse the ways in which literary strategies available to contemporary authors can represent and offer effective reconsiderations of non-human animal experiences within the epistemological logics of short-term comparative developmental experimentation. The methodological designs used within this sub-category of laboratory-based investigation cause non-human animals to be both more numerous, being multi-subject investigations, and more distant, complicate by systems of separation installed to ensure non-contamination. As demonstrated in the chapter, the result is that non-human animal presences become *quieter* in this empirical situation. This chapter argues that Lydia Millet's 'Love in Infant Monkeys', Karen Joy Fowler's 'Us', and Ursula Le Guin's 'Mazes' represent three different literary strategies that critique and rebalance the stringent modes of temporal regulation, systems of autonomy, and the logics of value, that are all profoundly influential on the non-human animal experience within the experimental setting. The chapter contends that the value of its critical approach lies in its ability to frame different *kinds* of knowledges produced in this epistemological setting and make visible other, less obvious, but still highly valuable, human and non-human animal encounters occurrent there. The thesis now moves to consider another sub-division of

[463] Despret, 'The Body We Care For', p. 115.

[464] Le Guin, p. 59.

laboratory study where scientific methods of temporal control and systems of autonomy used on non-human animals are implemented in their most regiment form: invasive practices that utilise non-human animals as biomaterial.

Chapter Four

‘The human body writ small’: Revitalising the Non-Human Animal in Invasive Scientific Practices

> The love of a dog for his master is notorious; in the agony of death he has been known to caress his master, and every one has heard of the dog suffering under vivisection, who licked the hand of the operator; this man, unless he had a heart of stone, must have felt remorse to the last hour of his life.
>
> – Charles Darwin, *The Descent of Man*[465]

The historical use of non-human animals in invasive scientific practice is extensive and, broadly speaking, split into two categories: vivisection and dissection. Vivisection is the practice of surgical exploration on a living or conscious non-human animal to view active internal biological systems, whilst dissection is performed to examine a research subject post-mortem. As Darwin’s mention evidences, even for the founding father of biology and evolutionary science, vivisection was always a polemical topic right from its earliest point of genesis. Certainly, vivisectional practice on non-human animals instigated one of the most volatile periods in modern empirical science, as ‘[i]n the nineteenth century a focus on physiological processes in action, and the advent of germ theories of disease and their claims to universality for disease causation, led to renewed interest in extrapolating from animal models to understand human physiological and pathology’.[466] Emergent anthropocentric sensibilities so prevalent in the sciences saw vivisection justified, adopted and practiced widely by those within the developing medical professions. However, simultaneously, it was answered by the rise of the antivivisection movement, a diverse collection of opponents who challenged it on both moral and religious grounds. The gruesome

[465] Charles Darwin, *The Descent of Man*, p. 33.

[466] Michael A. Finn and James F. Stark, ‘Medical Science and the Cruelty to Animals Act 1876: A re-examination of anti-vivisectionism in provincial Britain’, *Studies in History and Philosophy of Biological and Biomedical Sciences*, 29 (2015), 12-23 (p. 13).

consequences inherent to a newly developing practice ensured that the immoralities of vivisectional practice were still being fiercely contested well into the succeeding century.

During this time, the vivisection debate drew in those operating outside the empirical sciences, transcending the strictures of science to become intertwined with upheavals of gender systems and social class-related activism, resonating particularly with proponents of concurrent emergent humanist literary movements. Consequently, many of the most influential figures of the mid-nineteenth century rallied to join the opposition to vivisection, including Charles Dickens, Robert Browning, Leo Tolstoy, Lewis Carroll, Mark Twain and George Bernard Shaw.[467] C. S. Lewis, a particularly notable proponent of antivivisection, wrote:

> It is the rarest thing in the world to hear a rational discussion of vivisection […] Now vivisection can only be defended by showing it to be right that one species should suffer in order that another species should be happier […] The victory of vivisection marks a great advance in the triumph of ruthless, non-moral utilitarianism over the old world of ethical law; a triumph in which we, as well as animals, are already the victims, and of which Dachau and Hiroshima mark the more recent achievements.[468]

Lewis positions the inherent immoralities of vivisectional practice alongside those that drove the Holocaust and the nuclear event on Hiroshima. Similar parallels were drawn in other humanist critiques of post-war modernity, notably Max Horkheimer and Theodor W. Adorno's philosophical work *Dialectic of Enlightenment*, first published in 1944. They proposed a growing irrationality of reason during the mid-twentieth century, accelerated by notions of domination, to become '[w]hat human beings seek to learn from nature is how to use it to dominate wholly both it and human beings […] Power and knowledge are synonymous […] The disenchantment of the world means the extirpation of animism'.[469] Traditional cultural perceptions and representations that had originally attributed a living soul or spiritual essence to the non-human animal were quickly

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[467] Debbie Tacium, 'A History of Antivivisection from the 1800s to the Present', *Veterinary Heritage: Bulletin of the American Veterinary Medical History Society*, 31 (2008), 21-25 (p. 22).

[468] C. S. Lewis, 'Vivisection', in *God in the Dock*, ed. Walter Hooper (Grand Rapids, MI: William B. Eerdmans, 1970), 224-228 (pp. 224-225).

[469] Max Horkheimer and Theodor W. Adorno, *Dialectic of Enlightenment: Philosophical Fragments* (Stanford: Stanford University Press, 2002), p. 2.

superseded by epistemological modes exalting mechanomorphic deconstruction. If nature was to be accessible to systematic, scientific interpretation, then traditional notions of animism had to be eradicated. Horkheimer and Adorno suggest that this philosophical shift, this irrationality, was born from humanity's fear of the unknown, that '[h]umans believe themselves free of fear when there is no longer anything unknown'[470], and the result being that '[f]or domination's bloody purposes the creature is only material'.[471] The popularity of invasive science on non-human animals during the modern era thus correlates alongside a wider idealism that, for humanist opponents, symbolised the decline of nonreligious human morality.

Simultaneously, the sciences withdrew further into the isolationism that characterises them today, widening the distance between themselves and, not only the humanities subjects, but the general public. The exclusivity of a self-sustained and self-regulated sub-culture permitted those expertly trained within the empirical sciences, with their own customs and vernacular, to obtain a level of independence specific to their own practices and protocols. Historian Debbie Tacium highlights, '[i]t was becoming more difficult for individuals, no matter their level of education, to straddle the barrier between scientific, experimentally acquired knowledge, and literary philosophy'.[472] It is important to note that practices of vivisection, in the traditional sense, are rare today, and those that are performed on Sauropsida (reptiles, birds etc.) and Mammalia are always conducted under anaesthesia to minimalize pain and discomfort, with various exceptions for other non-human animal classes. The term "vivisection" is now used pejoratively to encapsulate all invasive procedures on live non-human animals, regardless of procedural duration or severity.

Post-mortem dissection remains the most prevalent invasive procedure on non-human animals, in both laboratories and educational institutions at all levels. Whilst still vociferously challenged by non-human animal rights groups and anti-dissection proponents, dissection is determined to be the more humane way by which to perform biological investigative procedures. Many within their own field believe the sciences should be vigilant in identifying alternative non-human animal learning methods instead of relying on more traditional methods that favour their

[470] *Ibid.*, p. 11.

[471] *Ibid.*, p. 210.

[472] Tacium, p. 22.

biological consumption.[473] However, those looking to enrol in modern biological and biomedical practices are still expected to familiarise themselves with the practice of dissection. Writing on dissection as a developmental practice, biologist Thomas Lord wrote '[s]tudents in the experimental laboratory are involved not only in theoretical learning, but in manipulative-skill learning. They handle the structure, feel its weight, probe its consistency, and explore its constitution […] wonder about a structure's unity and marvel at a structure's complexity'.[474] Despite Lord's invocation of the term 'structure', the particulars of his example promote a sense of intimacy between human and non-human animal bodies, albeit when the subject is deceased.

Introducing the Fictional Texts

Sylvia Torti's *Cages* and Allegra Goodman's *Intuition* will provide the literary materials of the chapter, with both novels including fictional reconstructions of modern vivisection and dissection, respectively. In terms of how these texts affect how we understand the scientific methodology that shapes the chapter, both consider the affective potential that remains after the non-human animals are no longer animate or living within human and non-human animal encounters. *Cages* and *Intuition* explore scientific systems of power and autonomy within the laboratory space: how paradigms are argued and contested to permit exclusive freedoms and advantages to those operating within a structure that exalts opportunistic individualism. Particularly, they explore how these processes reverberate within interpersonal relationships and how empirical science rewards those who adhere to its strict methods of advancement. Consequentially, human presences are foregrounded, and non-human animal presences are backgrounded in the literary material, though the laboratory remains the mutual environment in which significant events occur.

Torti's *Cages*, published in 2017, is based within a modern-day U.S. laboratory in Salt Lake City, Utah. The empirical aims of the laboratory are to investigate and discover the biomechanics of birdsong, therefore determining the nature of cognitive learning and stored memory in the

[473] Jonathan Balcombe, 'Dissection: The Scientific Case for Alternatives', *Journal of Applied Welfare Sciences*, 4 (2001), 117-126.

[474] Thomas R. Lord, 'The Importance of Animal Dissection', *Journal of College Science Teaching*, 19 (May, 1990), 330-331 (p. 330).

avian brain. This would then be applied to human cognitive models of memory. The third-person narrative is split between the novel's three protagonists: research lead David, post-doctoral student Anton and laboratory technician Rebecca. Themes within the novel include human pursuits toward a sense of belonging, each of the three characters having been emotionally outcast in some way, and the capacities of memory to inform and influence past and present realities, offered through the tripartite romantic relationship that occurs. David, the most established scientific figure in the novel, is experiencing a period of dormancy in terms of professional achievements, his past breakthroughs had been a 'remarkable success […] He'd been the first to poke through a bird's skull and insert fine wires into single neurons, a technique that allowed him to survey a new landscape, mark the places on the brain that could, and did, acquire a type of language'.[475] In an attempt to reinvigorate his research and its production rate, avoiding more 'dead birds and dead ends while the expiration date on his remaining grant advanced', David hires Anton, a European post-doctoral student.[476] Anton represents the next-generation of bio-scientist and looks to modernise David's research approaches, at the same time safeguarding his own professional legacy by secretly pursuing his own avenues of empirical enquiry. Lastly, Rebecca represents a non-scientific presence in the laboratory space, arriving there from outside the profession, voicing her moral and ethical concerns for the treatment of the non-human animals throughout. The invasive nature of the procedures conducted on non-human animals in the novel is predominantly vivisection; birds are sedated, operated on and brought back to consciousness following human interference with their internal biological systems.

Torti herself occupies a unique position that spans both fictional and empirical realms, being a Professor of Biology at the University of Utah. Intriguingly, there exists a scientific publication that mirrors the surgical practices portrayed in her fictional reconstruction, funded by the U.S. National Institute of Health, drawn from later in the chapter. Torti acknowledges the novel to be 'the product of a decade-long conversation with Franz Goller, who gave me space in his birdsong laboratory', a research associate cited on the scientific publication.[477] The implication is that there is an equivalent scientific basis to Torti's novel that offers up the opportunity for a direct and precise comparison between scientific realism and strategies for its fictional reconstruction.

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[475] Sylvia Torti, *Cages* (Tucson: Schaffner Press, 2017), p. 17.

[476] *Ibid.*, p. 20.

[477] *Ibid.*, p. 297.

Allegra Goodman's *Intuition*, first published in 2006, is based at the Harvard tributary Philpott oncological research institute in Boston, Massachusetts during the mid-1980s, whose overarching biomedical investigative aims work toward effective treatments and potential cures of cancer in humans. The third-person, omniscient narrative is divided amongst numerous characters, both within and without the scientific profession. The story revolves around Cliff Bannaker, a talented post-doctoral student at the institute, and his discovery of a potential cure for cancer: his *R-7* antiviral formula. Cliff's tumultuous discovery causes both personal and professional loyalties to be forged and broken and his anticipated breakthrough reverberates throughout the wider scientific community, offering Cliff and the institute a chance for global renown and recognition. The story culminates in a review of Cliff's investigation by an external regulative body, who find him guilty of poor scientific practice which in turn affects the legitimacy of his results and he is thus finally made redundant. Crucially, Goodman's novel is a fictional reconsideration on the exclusivities, material excesses and expectant behaviours that make up the empirical scientific profession, as well as the subtle nuances and motivations that exist in terms of individual aspirations and the idiosyncrasies of interpersonal relationships within an institution. This conventional broader novelistic framework of exploring human values remains significant in terms of making sense of non-human animals in this specific laboratory setting, as the ownership of knowledge drives events in the novel, created with the participation of non-human animal subjects. The chapter analyses not only how participations still take place when the non-human animal occupies an inanimate state, but are complicated further when human invasiveness is representative of both human relationships and individual personal aspirations. In terms of invasive procedures on non-human animals, the novel includes the post-mortem dissection of mice purposely infected with cancerous cells and, subsequently, the development of carcinomic tumours.[478] Unlike in Torti's *Cages*, Goodman includes no non-scientific character within the laboratory space through which to deliberate the wider ethical implications of using non-human animals in this way. Consequently therefore, Goodman's narrative strategy threatens to leave the non-human animal presences in the novel as peripheral.

[478] An outline of both historical and current scientific uses of mice is provided in Nadia Rosenthal and Steve Brown, 'The mouse ascending: perspectives for human-disease models', *Nature Cell Biology*, 9 (2007), 993-999.

So as to remain focused on the key enquiry of the thesis, how literature can intervene in considerations of what it means to conduct experiments on non-human animals, it is essential to understand that the thematic priorities of both texts affect the non-human animals featured. For example, unlike in Colin McAdam's *A Beautiful Truth*, in which the foregrounded thematic is transparently what it is to conduct scientific experimentations on non-human animals, Torti and Goodman are not so blatantly interested in these same subjects. The justification for choosing two such examples of literary material is precisely their inclusion of invasive surgical practices on non-human animals, with their unique systems of value already relegating non-human animals to positions of materiality. Therefore, these fictional laboratories must be read in such a way that works against these processes of backgrounding, employing conceptual approaches that can re-centre the non-human animal presences and inform effective literary examination.

Jane Bennett's *vital materiality* framework

As previously denoted, Torti and Goodman include human and non-human animal encounters in which the non-human animal presences are inevitably *quieter*, determined by the logics of value that govern surgical and invasive scientific practices. The implication being that the non-human animals exists predominantly as biomaterial, placing them within systems of autonomy that reflect their materiality, threatening to invalidate their participation altogether. As the non-human animals featured are literally and metaphorically made quieter, eventually becoming inanimate after the killing moment, other more imperceptible forms of affection must be identified and considered. Elizabeth Johnson is one example of recent animal studies that considers the wider and spatial relations of surgical encounters, a conceptual approach that 'expands the present'.[479] As new terms of the encounter are renegotiated, the new existences of the non-human animal can help rebalance systems of autonomy and incorporate new material realties. To unlock these potentialities, the conceptual approaches of political theorist Jane Bennett are particularly valuable in mediating between scientific realism and fictional reconstructions.

[479] Elizabeth R. Johnson, 'Of lobsters, laboratories, and war: animal studies and the temporality of more-than-human encounters', *Environment and Planning D: Society and Space*, 33 (2015), 296-313 (p. 296).

Bennett borrows heavily from the abstract framework of Latour's *Actor Network Theory*, along with the familiar approaches of Despret and Haraway.[480] She formulates the theoretical concept of 'vital materiality', or, more broadly, the mutually affective agencies existing in actor networks consisting of humans, non-humans and inanimate matter.[481] Bennett's fundamental methodology focuses on and around political equalisation, looking to 'experience the relationship between persons and other materialities more horizontally', and thus avoiding complicative systems of human autonomy and power inherent to hierarchies of being.[482] Crucially, Bennett's approach can accommodate the inanimation of Goodman's dead mouse body to endow it with a different *kind* of agency during the human and non-human animal encounter: the ability to still *affect* and *be affected*.

Similar to Latour's terminology *actor network*, Bennett employs *assemblages* as the name by which to describe a group of objects of different or similar types found in close association with one another. Whether they be human or non-human, animate or inanimate, all objects must be considered to be *actors*, existent beyond the principles of materiality and equal contributors 'irreducible to the culture of objects'.[483] Assemblages can vary greatly in terms of size, depending on the number *actors* or *actants* (a source of action) that in turn form multitudes of interconnective points between them. Network parameters are thus advisable to avoid becoming lost in the potentially endless combinations of connective points at both micro and macro-levels of application. Bennett accommodatingly outlines the fundamental principles of her theoretical approach using her own example of an assemblage, a collection of extraneous objects observed caught in a drain:

> [T]hey were all there just as they were, and so I caught a glimpse of an energetic vitality inside each of these things, things that I generally conceived as inert. In this assemblage, objects appeared as things, that is, as vivid entities not entirely reducible

[480] Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network Theory* (Oxford: Oxford University Press, 2007).

[481] Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Duke University Press, 2010).

[482] *Ibid.*, p. 10.

[483] *Ibid.*, p. 5.

> to the contexts in which (human) subjects set them, never entirely exhausted by their semiotics.[484]

Bennett liberates each object, equalised now into contributory actors, from the influence of anthropocentric tendencies to place everything within systems of understanding that places the human at its centre. Within Bennett's assemblages, '[a]gentic capacity is now seen as differentially distributed across a wider range of ontological types'.[485] Furthermore, the actors and actants in these assemblages consist not only of the physical, but also the metaphysical and imperceptible, multiplying the potentialities in literary material where the non-human animal presences are backgrounded.

The Three Rs and the Ambiguity of Animism

The ethically dubious nature of invasive scientific procedures on non-human animals has necessitated a series of stringent protocols and codes of practice regarding, particularly, applications of pain and humane killing. From its earliest formation, protective legislation has been informed by William Russell and Rex L. Burch's 'Three Rs' (3Rs) principle, first published in their work *The Principles of Humane Experimental Techniques* in 1959, which outlined the improvement of experimental procedures through the tripartite concepts of replacement, reduction and refinement when using non-human animals in the laboratory.[486] The sociographical context of the 3Rs is fundamental in gaining an understanding of the ambiguities that will later emerge, as science historian Robert Kirk highlights: '[t]he moral outlook of *The Principles of Humane Experimental Technique* derived from an earlier ethos wherein humanistic and scientific values occupied a shared culture'.[487] Kirk summarises, 'the original formulation of the 3Rs can only be properly understood in the context of a scientific humanism that was inherited from the

[484] *Ibid.*, p. 5.

[485] *Ibid.*, p. 9.

[486] W. M. S. Russell and R. L. Burch, *The Principles of Humane Experimental Technique* (London: Methuen, 1959).

[487] Robert Kirk, 'Recovering the Principles of Humane Experimental Technique: The 3Rs and the Human Essence of Animal Research', *Science, Technology, & Human Values*, 43 (2018), 662-648 (p. 623).

Victorian period and already in sharp decline at the time of their constitution'.[488] The sciences and humanities subjects had yet to separate into the two epistemological cultures that characterise them today, of which the early twentieth-century antivivisectionist movement was a propellant force. The result being that the 3Rs are an amalgamation of *both* scientific and humanist principles that go some way to explain its inherent ambiguity and the range of social science and humanities interpretations that have revisited these principles more recently.[489] Therein lies the potential for humanist resonations throughout the doctrine, implemented in laboratories worldwide, to reverberate within fictional reconstructions of the same empirical space and explore the paradoxical notion of *care* within this specific scientific environment.[490]

The 3Rs principle relies on demarcations relating to *pain* and *fear*, considered along with other emotive response under the generalized term *distress*. These in turn are all determined as characteristics of *inhumanity* and placed in direct opposition with appropriated definitions of *humanity*. It is here that fundamental ambiguities begin to emerge, a result of Russell and Burch's convoluted merging of scientific and humanist approaches. Consequentially, this has divided opinion on the meaning of the 3Rs, as some believe '[Russell and Burch's] concepts of inhumanity and humanity do not themselves express value judgements but are strictly *descriptive* and *empirical*. The terms refer to objectively verifiable and measurable aspects'.[491] Whereas others, as Kirk highlights, believed definitions of humanity 'entailed a humane disposition towards animals premised upon kindness and benevolence, which in practice required action to diminish suffering and distress. Rather than being a tightly normative value, humanity was a general descriptive term'.[492] Further issues arise in restrictions pertaining to the imperceptible, as some

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[488] *Ibid.*, p. 625.

[489] Gail F. Davies, and others, 'Developing a Collaborative Agenda for Humanities and Social Scientific Research on Laboratory Animal Science and Welfare', *PloS ONE*, 11 (2016), 1-12.

[490] An example of recent reconsiderations of non-human animal care theories in the laboratory space is provided by Eva Giraud and Gregory Hollin's 'Care, Laboratory Beagles and Affective Utopia', *Theory, Culture and Society*, 33 (2016), 27-49; and Robert Kirk's 'Care in the Cage: Materializing Moral Economies of Animal Care in the Biomedical Sciences, c. 1945–', in *Animal Housing and Human-Animal Relations: Politics, Practices and Infrastructures*, ed. by Kristian Bjorkdahl and Tone Druglitro (London: Routledge, 2016), pp. 167-184.

[491] Jerrold Tannebaum, and B. Taylor Bennett, 'Russel and Burch's 3Rs Then and Now: The Need for Clarity in Definition and Purpose', *Journal of the American Association for Laboratory Animal Science*, 54 (March 2015), 120-132 (p. 121).

[492] Kirk, 'Recovering the Principles of Humane Experimental Technique', p. 637.

interpretations allow only measurable, physical emotive responses to incite consideration. The implication is that negative mental states or psychological trauma in non-human animals, are canopied under insufficient explanations of *pain* and *distress*. These same ambiguities are transferred to subsequent legislative outcomes, each being informed by different interpretations of these identified emotive criteria, the result being misapplication and circulation, and that 'there are currently in use a number of significantly different definitions of the 3Rs'.[493]

The ambiguous nature of Russell and Burch's principles increases further when considering the prioritization of specific moral foci, particularly anticipatory strategies for preventing *pain* and *fear*. When considered in more detail, this moral and ethical ordering highlights two intrinsic conceptual features of the 3Rs that leads to additional interpretive complications. Firstly, the 3Rs consistently look to ensure that the prevention of pain and fear are absolutely its primary objective, the implication being that death is somehow deemed less morally contemptable. Indeed, so long as non-human animals are killed by the correct method, it is regarded as a more acceptable endpoint as it carries no potential for extended pain or emotional trauma. Secondly, the various methods it proposes to be preventative are actually only ever limitative; certain *kinds* of pain and fear are permissible as preventative measures 'cannot be allowed to compromise the goals of conducting sounds science and achieving scientific and medical progress'.[494] These two ambiguous features raise a fundamental question: why are preventions of suffering absolutely the criterion by which to assess and appropriate the use of non-human animal in the laboratory? Why is *suffering* the only issue that concerns the 3Rs principle? These are the kinds of fundamental questions that literature aims to address, not only in order to highlight the limited moral breadth of scientific empiricism, but also to explore the potentialities of prioritizing other approaches, such as freedom, empathy and compassion.

Today, the 3Rs still inform the majority of western legal systems regarding the physical and psychological care of vertebrate non-human animals, though exceptions exist. Two prominent such examples are the U.S. *Animal Welfare Act* of 1966 and the United Kingdom *Animal Welfare Act 2006*, which ensure that research facilities and laboratories are recurrently monitored by regulatory bodies dedicated to maintaining these predetermined standards of care outlined by governmental law, retaining the 3Rs at their heart. However, within these various laws and

[493] Tannebaum and Bennett, p. 131.

[494] *Ibid.*, p. 123.

permissions exist degrees of nomothetic ambiguity regarding the non-human animal during surgically invasive procedures, as the protective influence of the legislation differs pertaining to the unconscious non-human animal body. A brief outline of two such protective legislations, those specific to surgical and invasive practices, is therefore beneficial to the purposes of this chapter investigation.

In the U.S., non-human animals are protected by the *Animal Welfare Act* signed by President Lyndon B. Johnson in 1966, who was greatly motivated by his own personal affection for dogs. As such, the bill was introduced primarily to clarify and outline the extent of legal liberties concerning pet owners and domestic animals. *The Animal Welfare Act Amendments* of 1976 and *The Improved Standard for Laboratory Animals Act* of 1985 saw the further clarification of laws ensuring the humane care, housing and treatment of laboratory animals specifically. These expanded legal protections to include all warm-blooded animals in laboratories, provisions of veterinary care and introduced procedural measures that eliminate or minimize the unnecessary duplication of experiments on animals. Legislation relevant to research facilities and laboratories is updated and maintained by the Institutional Animal Care and Use Committee (IACUC), a regulatory body 'qualified through the experience and expertise of its members to assess the research facility's animal program, facilities, and procedures'.[495] However, it is interesting to note that even today '[t]here are no federal requirements to report the number of these animals used in experimentation or the types of procedures conducted on them'.[496]

In the United Kingdom, non-human animals are broadly protected by the Animal Welfare Act 2006, introduced to collate and consolidate numerous past pieces of protective rights legislation into one procedural law. However, this legislation is made legally redundant regarding non-human animals in the laboratory space, who are instead protected by the prior established *Animals (Scientific Procedures) Act 1986*, which specifically standardizes practices including care and treatment of non-human animals for scientific use. The Act has undergone several amendments since its genesis, both to the benefit and detriment of the non-human animals under

[495] United States Department of Agriculture and Plant Health Inspection Service, 'Animal Welfare Act and Animal Welfare Regulations' (United States Department of Plant Health Inspection Service, 2017), p. 56.

[496] Aysha Akhtar, *Animals and Public Health: Why Treating Animals Better is Critical to Human Welfare* (London: Palgrave Macmillian, 2012), p. 157.

its legal jurisdiction.[497] For example, in 2013 the legislation was revised to extend protection to cephalopods (octopus, squid etc.) in scientific experimentation, but also increased access to non-human animals during their foetal and embryonic development, protecting only the last third of their gestation or incubation period rather than half as was previously determined. Again, as in the U.S., the Act consciously employs the same Three Rs principle in the administration of its law, regulated and maintained by an independent ethics panel formed by the Secretary of State.

These two instances of protective legislation attempt to lawfully determine the exact nature of invasive, surgical procedures on the non-human animal. The U.K. *Animal (Scientific Procedures) Act 1986* defines a 'regulated procedure' to be any action 'carried out on a protected animal and may cause that animal a level of pain, suffering, distress or lasting harm equivalent to, or higher than, that caused by inserting a hypodermic needle according to good veterinary practice'.[498] In the U.S., the consultative *Guide for the Care and Use of Laboratory Animals*, a collaboration of peer-reviewed, approved ethical procedures, outlines the nature of surgical practice:

> In general, surgical procedures are categorized as major or minor and in the laboratory setting can be further divided into survival and nonsurvival. Major survival surgery penetrates and exposes a body cavity or produces substantial impairment of physical or physiologic functions […] Minor survival surgery does not expose a body cavity and causes little to no physical impairment […] Minor procedures are often performed under less-stringent conditions than major procedures but still require aseptic technique and instruments and appropriate anaesthesia […] In nonsurvival surgery, an animal is euthanized before recovery from anaesthesia.[499]

This approach is also echoed in U.K. legislation, which determines surgery to be any regulated procedure that employs the 'use of an anaesthetic or analgesic, decerebration and any other

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[497] Robert Kirk, 'The Invention of the "Stressed Animal" and the Development of a Science Welfare, 1947-86', in *Stress, Shock, and Adaptation in the Twentieth Century*, ed. D. Cantor and E. Ramsden (Rochester: University of Rochester Press, 2014), pp. 241-263

[498] The Animals (Scientific Procedures) Act (Amendment) Order 1993 (23 August 1993).

[499] Institute of Laboratory Animal Resources, *Guide for the Care and Use of Laboratory Animals* (Washington D.C., National Academy Press, 1996), pp. 61-62.

procedure for rendering an animal insentient'.[500] Both examples of legislative material continue to define terminologies such as euthanasia, both minor and major operative procedures, painful procedures, recoverable and non-recoverable procedures, as well as distress and discomfort amongst other various sub-categorizations. Returning to the focus of this chapter, the ambiguities present in both sets of legislation offer pose a particular representational challenge for contemporary authors when considering specific protective legalisation that justify these same invasive procedures. Particularly, how can they represent practices in such a way that still encourages a constructive reconsideration of the human and non-human animal encounters that happen without losing the impression of their particular legal situation that determines the very nature of their experiential existence.

Representations of Legislative Protection in *Cages* and *Intuition*

Certainly, Torti's *Cages* and Goodman's *Intuition* incorporate the legal realities of invasive practices on non-human animals into their narrative to ensure a sense of realism is maintained throughout. Both establish external, regulative presences that inform and ultimately determine the empirical activities of each fictional laboratory. In *Cages*, David's laboratory relies entirely on permissions granted by a national regulative body which determines the necessity of its practices and dictates procedure to perform invasive procedures on birds. Indeed, David's past successes are due to the fact he 'successfully lobbied Congress for funding, making the case that although the brain was composed of a hundred billion neurons, it could be and would be understood'.[501] David recounts of his appeal to Congress:

> They promised to cut open the skull and tease the meaning from pink fatty tissue. Studying neurons […] would allow them to create navigational maps much like early explorers did for Africa, the Amazon and the Arctic, maps that would help people find their way inward, from behaviour to nerve to gene, helping them grasp the most elemental understanding of themselves and the sentient world. If nerves were like yarn, they said, they could loosen the skein, untwist the knots, find the beginning.

[500] Animal (Scientific Procedures) Act 1986, p. 2.

[501] Torti, p. 19.

> Congressional support was bipartisan: the brain and its diseases had no political enemies.[502]

Torti's invocation of colonialist vocabularies, coupled with those provocative of animal husbandry and materiality through the wool or textile imagery, suggest a policy that looks to acquire full political control over a territory which will be occupied, subjected to invasive treatments and ultimately exploited. It implies that the legal freedoms permitted to scientists allow for the possession or ownership of the non-human animal body, both alive and dead. Torti's reductionist undertones to the bird's internal cognitive systems are contrasted with connotations of macro-level exploration, discovery, ownership and all the hallmarks of global fame for the investigators, having '[t]heir work published in *Science* and *Nature* and every paper was celebrated with champagne'.[503]

Goodman's *Intuition* employs a similar sense of dependence on appeasing the external regulatory bodies, emphasising the legal and thus experiential situation of the non-human animals involved through association. Two characters in the novel encapsulate this sense of accountability: laboratory directors Marion Mendelssohn and Sandy Glass. At the beginning of the novel both characters look to discourage Cliff in his development of the *R-7* virus strain, which at the time appears unprofitable in terms of both results and financial spending. Certainly, Sandy regards Cliff's experimentation as so wholly stagnant he implores him to 'end the wholesale extermination of our lab animals'.[504] Marion echoes his anxieties, stating they do not have the money, though 'she didn't mean funds for the mice themselves, which cost about fifteen dollars each, but the money for the infinite care the delicate animals required'.[505] Marion and Sandy's concern for Cliff's moribund research stems from their wider interest for the laboratory's finances and the future of its various other tributary projects. Like Torti's David, Marion is conscious of external pressures:

> She knew as well as [Sandy] that their old grant from the National Institutes of Health was ending, that last year's research gambit had failed […] She knew they had to put

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[502] *Ibid.*

[503] *Ibid.*, pp. 19-20.

[504] Allegra Goodman, *Intuition* (London: Grove Atlantic Ltd., 2010), p. 6.

[505] *Ibid.*

> together a resoundingly good grant proposal for NIH by April first or contemplate folding. The Philpott Institute was governed by strict Darwinian principals. Investigators broke even or went bankrupt, losing staff and space and equipment to their rivals.[506]

Goodman's interpolation of the scientific and cultural term *Darwinian* is provocative, applying its weighty connotations of competition, survival, and reproductive dominance those within the empirical sciences and the field itself. It also proposes a degree of natural progression and development, ironically so as it is most certainly directed by anthropocentric approaches and artificially developed empirical scientific dogma. Certainly, the non-human animals always remain objects in the empirical design outlined by David, being simply scientific apparatus to be ordered, stored, and used, with their materiality justified by regulatory legislations. In *Intuition*, and when Cliff's investigations into the *R-7* strain hint at a promissory future concerning effective treatments in human health, concerns about the number of and manner in which laboratory mice populations are used are of no more concern; justified by inherent logics of sacrifice.

Goodman highlights the individualistic nature of each research project. Each empirical methodology determines the experience of non-human animals in terms of resident lab-based populations, feeding and care programs, preceding and during their use as biomaterials. Even for invasive surgical procedures conducted post-mortem, the non-human animal exists before the terminal event itself and fictional reconstructions of the laboratory space can again manipulate issues of temporality to accommodate these considerations. For example, Goodman allows the reader to follow Marion into the laboratory from the outside in:

> [S]he made her way toward the numbered doors where the Philpott's mice were kept. Each door had a window tinted red. From the outside looking in, each holding area looked like a little room in hell […] The animals needed rest, and the red windows shielded them from the hall lights at night […] She had worked with many strains of mice in her time and knew their particular traits […] some thin, some fat, some drug addicted, some healthy, some sick by design.[507]

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[506] *Ibid.*, p. 17.

[507] *Ibid.*, pp. 22-23.

Goodman fictionally animates the laboratory population of mice, expanding their temporal existences to include the time before the predetermined endpoint, deemed useful by empirical science, to propose a fuller experience than suddenly appearing as biomaterial. As noted by Goodman's narrator, these experiences involve deliberate alterations of their internal biological systems, including the application of cancerous tissues, but nevertheless they exist beyond the purposes and rigid scope of the biomedical study. Critically, Marion does not consider the entire experiences of the mice, instead being simply 'an attentive and compassionate investigator, almost fond of her small charges, proud and careful of them – not as if they had rights or souls, but as a craftsman might treat precious tools'.[508] Goodman implicates two different and opposing kinds of value systems here: the transcendental versus the instrumental. Whilst initially Marion seems only concerned with final results and epistemological outputs of the biomedical empirical design at work, Goodman's insinuations of craftsmanship propose future results are ensured through the maintenance and care of her tools. These represent the instruments by which she can access and translate biological information into scientific materials. All the while, Marion's actions are justified by the legal ratification of invasive practice on non-human animals in the laboratory space, allowing for the reduction of the mice into biomatter at the cellular level by which tangible and ultimately valuable results can be produced.

Torti's fictional laboratory is susceptible to the same influences of regulatory bodies and dominant research trends in the certain scientific field being explored, as David himself is usually 'banging the keyboard of his computer writing another paper or grant proposal'.[509] David's choice of empirical enquiry meant that at the outset 'he would be studying communication, not cancer. There was less money for research on birds than mammals because the genome in birds hadn't been sequenced as it had been in mice […] no way to knock out sections of the genetic code and test hypotheses'.[510] Torti is acutely aware of the influence of dominant paradigms that dictate research paths and the subsequent effect this has on the experiences of the non-human animals they involve. These types of methodological favouritisms, in terms of the popularity of some non-human animal species over others, mean that certain research pathways are afforded more in terms of finances, facilities and, subsequently, permitted greater investigative invasive freedoms than others. Indeed, following Anton's potential breakthrough in locating where memory is stored

[508] *Ibid.*, p. 23.

[509] Torti, p. 37.

[510] *Ibid.*, p. 83.

in the bird's internal biological system, Torti's laboratory is permitted greater resources to pursue the lead:

> David had hired a small army of undergraduate students and the lab had gone from a quiet place to a crowded, drumming space that worked around the clock. The lights were on most of the time and the birds sang day and night […] Anton went home only to shower and often forgot to shave.[511]

The fundamental change in the birds' experience is disregarded as the subsidiary result or biproduct of increased rates of production, a greater volume of output and valuable results that regard the responses of the birds to be the same as under normal conditions. This in turn affects lab-based populations, as David now requires '[t]hirty of everything. Zebra finches, Bengalese finches. The rest I will have to collect in the wild'.[512] As well as an obvious interest in the practicalities and moral questions underpinning trade in non-human animal species for experimentation here, Torti's narrative sees a significant shift in the quotidian experience of both birds already in captivity and those sourced from the wild, creating new encounters between greater numbers of birds and humans through imposed proximities.

Certainly, the potential successes of Anton's investigation change the nature of the day-to-day practices of the laboratory, and the quotidian experience of the non-human animals adapting to accommodate them. The nature of their laboratory's research already affords David, Anton and Rebecca other *kinds* of encounters than in other institutions, as '[t]heirs was the only laboratory at the institute that studied birds, the only one that smelled of dust and seed'.[513] Already, the sounds and smells of David's laboratory have been established in the narrative, the sensory experience of the space fictionally recreated. Torti goes on to emphasize the idea that the fundamental methodologies of each empirical space wholly dictating the nature of the space and the experience of the non-human animal. She achieves this by fictionalising another laboratory within David's own institution that Rebecca visits:

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[511] *Ibid.*, p. 213.

[512] *Ibid.*, p. 219.

[513] *Ibid.*, p. 47.

> The other neuroscientists studied mice which were kept in the basement. David had taken her down for a tour and she'd seen the rooms, each with hundreds of twelve by twelve-inch cages. Bred to express one gene or another, only their blood, cells and DNA mattered. Once the right strains were achieved, the mice were guillotined and frozen or ground in a blender. Liquid samples of blended skin or neat slices of brain could then be brought up to the laboratories for analysis.[514]

Though only given brief mention in the narrative, Torti here employs a fictional strategy that introduces the parallel existences of other spaces, each with a different empirical design which affects the non-human animal experience. By having Rebecca walk into and observe an adjacent laboratory space, Torti draws attention to the different temporal logics at play that determine non-human animal existences, from laboratory lighting fixtures to the physical proximities of cages, and even time of death. Torti's representation of these separate laboratory spaces delineate a shift between different spatial logics and implicate the experiential existence of the non-human animal located in each situation. Therefore, the non-human animals can be viewed in comparison with the specific value systems outlined in the except above, where some biomaterial features matter more than others, highlighting the selectivity of different scientific investigations, different configurations of a similar cultural terrain, and emphasizing the influence of methodological practices on the experience of the non-human animals themselves. Unlike David's laboratory, where its key methodological feature is that the birds must remain able to sing, the adjacent laboratory needs only non-human animal biomaterial, and so its principles of care and maintenance are entirely different. Therefore, in this second space, encounters orientate around nutrition, physical welfare and, crucially, perennial termination to achieve viable results. Mice are selected based on accessibility to species populations, housing, financial costs, reproducibility and legal determinations of viable species killing. As David notes, 'you don't need to *see* or *hear* a mouse'.[515] Though, more accurately, the investigators do not need to see or hear a mouse only because it is not the phenomenon being studied in this particular empirical investigation.

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[514] *Ibid.*

[515] *Ibid*.

The Ratification of Pain, Discomfort, and Death

Protective legislation determines the nature of both physical and psychological pain and different levels of severity in order to justify and legally ratify its application during invasive surgical experimentations, where the non-human animal is being experimented on *in vivo*. The U.S. *Animal Welfare Act* determines these definitions according to conclusionary research works conducted by a variety of external, intercollegiate advisory bodies. One such example is the Committee on Recognition and Alleviation of Pain in Laboratory Animal Research, which defines pain in vertebrates to be '[a]n unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage'.[516] The guidelines go on to attempt the quantification and qualification of different levels or experiences of pain, or 'pain descriptors', including momentary pain, 'postprocedural/postsurgical' pain, persistent pain and chronic pain.[517] The latter is determined to be the most difficult to manage, often without relief and may require that the non-human animal be euthanised.

Strategies for pain management 'often begins with general (surgical) anaesthesia, but also include local anaesthetics, analgesics, anxiolytics, and sedatives […] Pain management goals range from total elimination (as, for example, during general anaesthesia for a surgical procedure) to pain that is tolerated without compromising the animal's well-being'.[518] It is noticeable that these demarcations only consider application of initial sources of pain, without considerations for the periods following surgical procedures, pain experienced during the recovery stage. Curiously, the committee acknowledges 'that pain in animals is difficult to assess, most because of a lack of methods to validate and objectively measure it […] behavioural indices and careful extrapolation from the human experience should be used to assess pain in research animals'.[519] Indeed, this particular deliberation takes on a rather ambiguous, as well as ominous, dimension when considering invasive surgical practices.

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[516] National Research Council, *Recognition and Alleviation of Pain in Laboratory Animals* (Washington DC: The National Academies Press, 2009), p. xii.

[517] *Ibid.*

[518] *Ibid.*, p. 73.

[519] *Ibid.*, p. 3.

The ambiguities particularly surrounding the ratification of pain or distress arises due to the inherent principles upon which it is based, these being entirely appropriated by scientific needs and human definitions of usefulness, being '[w]hen laboratory animals are subjected to conditions that do cause pain or distress, then ethically – at least from a utilitarian perspective – the benefits must outweigh the costs'.[520] Who then defines the benefits and their opposing costs? Those with the relevant expertise and knowledge of using animals in the laboratory, the same consultancy boards and agencies employed to outline and regulate the protective legislation. This is not to simply propose that the decisionmakers are biased always toward the benefits of scientific investigations. Rather it is to suggest that the lives of non-human animals are considered differently by those within the scientific discipline compared to those outside it. Undeniably scientific objectivism means there exists a level of professional necessity regarding the processes of inducing pain in the non-human animal. This could potentially lead to an underestimation of the 'shocks, burns, lesions, crashes, stresses, diseases, mutilations, and the general array of slings and arrows of the laboratory environment'.[521]

Protective legislation also regulates when and how non-human animals are killed. Usually, this is determined to be toward the end of the scientific experimentation, dependent on the physical state of the subject, signalling the end of its *in vivo* participation. Though procedural specifics are ultimately determined by external consultative panels, the U.S. Animal Welfare Act determines that '[a]nimals that would otherwise experience severe or chronic pain or distress that cannot be relieved will be painlessly euthanised at the end of the procedure or, if appropriate, during the procedure'.[522] The U.K. Animals (Scientific Procedures) Act 1986 also resolves that '[w]here a protected animal has been subjected to a series of regulated procedures for a particular purpose […] [or] at the conclusion of the series is suffering or likely to suffer adverse effects […] the person who applied those procedures […] shall cause the animal to be immediately killed by a method appropriate to the animal'.[523] These terminative processes are dubbed 'humane endpoints', an appropriated term to justify the killing of the non-human animal

[520] *Ibid.*, p. 11.

[521] Deborah G. Mayo, 'Against a Scientific Justification of Animal Experiments', in *Ethics and Animals*, ed. by Harlan B. Miller and William H. Williams (New Jersey: Humana Press, 1983), pp. 339-361 (p. 339).

[522] Animals Welfare Act, p. 59.

[523] Animals (Scientific Procedures) Act 1986, p. 12.

subject.[524] The legislative freedoms pertaining to terminations and death of non-human animals are operational characteristics of invasive surgical practice that feature throughout both Goodman and Torti's novels, and so a brief overview of legislative protections permitted to the laboratory situation facilitates a more effective consideration of the literary reconstructions of the same processes. Crucially, these endpoints are misleadingly indicative of the *end* of the non-human animals involvement in invasive surgical practices, however endpoints influence and dictate the entire non-human animal experience up to and during the moment of termination, as well as the treatment of their bodies afterwards.

Humane endpoints are identified as 'the earliest indicator in an animal experiment of severe pain, severe distress, suffering, or impending death'.[525] Subsequent legislative materials centralise and standardise practices to carry out terminal processes, offering 'an excellent overview of the methodologies to determine humane endpoints yet still achieve study aims'.[526] Naturally, these regimented practices vary in terms of application, being entirely dependent on the nature of the empirical investigation and are interpreted accordingly. The humane endpoint in any given scientific experimentation is therefore assessed individually, being either approved or refused by an external ethics committee. The act of humane killing non-human animals is summarised to be 'the act of inducing death without pain […] as rapidly as possible and with a minimum of fear and anxiety'.[527] Examples of humane killing methods include overdose of anaesthetic suitable for the species by either injection, inhalation or immersion, dislocation of the neck, decapitation or concussion ensuring the destruction of the brain, and exposure to high concentrations of carbon dioxide.[528] However, many instances of protective legislation fail to demarcate clearly between those non-human animals that dies *before* an experiment begins, and those that die *during* or *after*.

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[524] National Research Council, *Recognition and Alleviation of Pain in Laboratory Animals*, p. 2.

[525] Organisation for Economic Co-operation and Development, *Guidance Document on the Recognition, Assessment, and Use of Clinical Signs as Humane Endpoints for Experimental Animals Used in Safety Evaluation* (2000), p. 10.

[526] National Research Council, *Recognition and Alleviation of Pain in Laboratory Animals*, p. 122.

[527] *Ibid.*, p. 131.

[528] Animals (Scientific Procedures) Act 1986, p. 21.

Logically, post-mortem dissection requires the non-human animal to be killed *before* the experiment begins, in order to access biological tissue, organs and fulfil the purposes of the broader empirical design. These early terminations occur more frequently in some research areas than others. For instance, humane endpoints in cancer research depend on the type, size and aggression of certain cancers or tumorous growths within the non-human animal. Surgical procedures that would only incite severe blood loss or haemorrhaging are deemed non-recoverable and therefore humane endpoints are established early, before the invasive surgical procedure itself begins. The U.K. Co-ordinating Committee on Cancer Research guidelines propose that '[c]onsiderable care should be given to the judicious choice of end point for tumour growth, bearing in mind the objectives of the experiment and the underlying biology'.[529] Toxicology research also relies on post-mortem investigations on non-human animals. Though legislation is again ambiguous concerning early terminations, as 'although predictive models for some toxic end points, such as mutagenicity, already exist, more mechanistically complex end points – such as acute, chronic, or organ toxicity – are more difficult to predict'.[530] Research into other, more severe types of toxicological substances would also provoke considerations of human safety and therefore further dictate the endpoints of non-human animals subjects.

The nomothetic ambiguity of the legislation for standardised and regimented endpoints for non-human animals in the laboratory space means that, ultimately, the scientific investigation always retains priority. Certainly, if the pain and suffering experienced by the non-human animal is deemed to reach a level considered unethical or immoral, it is only ever by the standards established by the relevant advisory bodies, only then are they terminated. Conversely, should the aim of the scientific investigation rely precisely on the *existence* of pain and suffering, or exposure unto death, then the protective laws become malleable. Both the U.S. and U.K. legislature for non-human animals are subject to discretionary permissions by the Secretary of Agriculture or Secretary of State respectively. For example, the U.S. directive states that '[n]o animal will be used in more than one major operative procedure from which it is allowed to recover', unless '[i]n other special circumstances as determined by the Administrator on an

[529] United Kingdom Co-ordinating Committee on Cancer Research, 'Guidelines for the Welfare of Animals in Experimental Neoplasia', *British Journal of Cancer* (1998), 1-10 (p. 3).

[530] National Research Council, *Toxicity Testing in the 21st Century: A Vision and a Strategy* (Washington D.C.: The National Academies Press, 2007), p. 101.

individual basis'.[531] Therefore, should the empirical investigation rely on repeated trauma or surgical investigations, permissions can be granted to ensure the continuation of the scientific research. Ultimately, instances of nomothetic protective legislation are being continuously appropriated to each empirical design, whilst also acting to satisfy wider human moral or ethical quandary.

The inclusion of two examples of protective legislation of non-human animals in the laboratory space is not to finally determine its efficiency or validity of scientific idealisms. These issues occur well beyond the remit and expertise of this study, certainly as '[t]he historical controversy surrounding animal research is far from being settled […] key arguments have not differed since the rise of antivivisection in nineteenth-century England'.[532] Instead these legislative materials give us an insight into what happens to the non-human animal body; processes intrinsically tied to the legal ratification of pain, suffering and implementation of death. These constructs dictate the ways and when killing of non-human animals occurs, totally altering the fundamental complexion of human and non-human animal encounters within the laboratory space. Can meaningful encounters still occur post-mortem? If so, how does this occur when the non-human animal contributor is dead? Importantly, how can literary representations negotiate circumstances to fictionally reconsider the different ways encounters happen in this empirical setting?

Reanimating the Inanimate Non-Human Animal in *Cages*

Sylvia Torti's *Cages* features fictionalised instances of vivisection on birds and incorporates scientific determinations for the regulation and ratification of pain or discomfort into the fictional strategy. Torti's scientific basis of the novel takes from her own historical primary research aims, to 'present data on the relationship between beak movement and sound properties in zebra

[531] Animal Welfare Act, p. 23.

[532] Franco, 'Animal Experimentation in Biomedical Research: A Historical Perspective', p. 262.

finches'[533] in order to 'ask questions about the selective pressures involved in song evolution'.[534] The non-human animal participants of the investigation are summarised in the methodology:

> Ten adult, male zebra finches (*Taeniopygia guttata*) were used as subjects. Individuals were housed at 22°C on a 14:10 light:dark cycle and supplied with seed, water and vegetables *ad libitum*.[535]

Naturally, this is the only mention of the quotidian experience of the zebra finches outside of the experimental practices and procedures, not being the empirical focus of investigation. It is assumed that the ten non-human animal subjects are all identical in every way, both physically and cognitively. Though ambiguities remain, as the ultimate fate of the participants after experimentation is not divulged, nor is there any mention of unsuccessful surgical procedures on animals that may not have made the final selection. However, it does offer an initial, broad impression of living conditions, and the absolute control of scientific determinations of non-human animal care and the regulation of potential variables. It provides a basic daily framework on which Torti builds her reconstruction. She expands the temporal existence of the finches beyond the remits of the empirical narrative, within a reimagined laboratory space that is then populated by fictional characters against which to construct human and non-human animal encounters.

The first instance of invasive surgical practice in the novel is performed on a zebra finch, referred to by David and Anton as *Red 31*. The empirical basis of the procedure is to determine the biological functions of bird's singing capabilities, much like Torti's own investigation. During the preparation stage, Anton notices that 'David hadn't yet removed the food dish from the cage, which violated protocol he'd been taught […] Full stomachs didn't go well with anaesthesia'.[536] This certainly aligns with Torti's own procedure, as '[b]irds were deprived of food and water 1 h prior to surgery, and surgeries were performed under isoflourane anaesthetic'.[537] Anton has

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[533] F. Goller, and M. Mallinckrodt, and S. D. Torti, 'Beak Gape Dynamics during Song in the Zebra Finch', *Developmental Neurobiology*, 59 (June 2004), 289-303 (p. 289).

[534] *Ibid.*, p. 290.

[535] *Ibid.*

[536] Torti, p. 36.

[537] Goller et al., p. 290.

therefore *learned* his scientific behaviours, a code of practice that is intrinsically tied in with peer-reviewed predeterminations of what are acceptable levels of pain and discomfort induced in non-human animals. These learnt protocols dictate Anton's actions during the human and non-human animal encounter, differing depending on whichever investigation is being carried out. Due to the invasive nature of the procedure conducted on *Red 31*, Anton does not remove the food dish to prevent discomfort, but to avoid what is deemed to be bad science in this particular scenario. Any notion of Anton acting on empathetic sensibilities is somewhat neutralised by his performing the surgical procedure in the first place, his motivations based on being '[c]onvinced that the bird was going to perform'.[538] The loaded term *perform* proposes an element of predetermined expectation and anticipation on the part of the investigator; a form of personal motivation suggestive of investigational bias. Furthermore, David also shares in Anton's scientific conditioning, increasing a sense of ethnological distance between both characters, the laboratory that they inhabit, and the reader.

Upon being anaesthetised, *Red 31* begins the transition from sentient subject to material object, the procedural purpose being to fit it with 'thermistors that would measure airflow through the two halves of the syrinx, the bird's version of a larynx'.[539] Torti's narrative describes:

> David rinsed and dried himself with industrial paper towels before he slipped his hand into the cage and encircled the male zebra finch with his palm. He positioned the bird on the surgery table, his hands gently holding its head while it jerked into aesthetic sleep […] David sat down, rolled the chair toward the table and focused the microscope onto the bird. Anton positioned himself at his side and together they began to work.[540]

Within the laboratory, the surgical table becomes a space within a space, an area permitted specialized freedoms to conduct invasive surgical practices on non-human animals. Presurgical routines paradoxically exalt methods of sterilisation and decontamination in order to perform deliberate contaminations of the sedated and exposed non-human animal body. The act of anaesthetisation eliminates any immediate concerns of inducing pain and discomfort, as the bird

[538] Torti, p. 37.

[539] *Ibid.*, p. 40.

[540] *Ibid.*, p. 38.

is unconscious it is assumed it cannot feel. Permissions to anaesthetise the birds are allowed by predetermined procedural guidelines, or learnt scientific behaviours, that favour anaesthesia in this particular example of surgical practice. Perhaps rather illogically, for David and Anton to study the biomechanics of birdsong, an entirely aesthetic phenomenon, the birds must be subjected to anaesthetic; the elimination of consciousness or bodily sensations.

Paradoxically, David's success and reputation rests on his ability to surgically interfere with internal mechanisms of birds, without impeding their biological function to sing in order to measure their auditory feedback. Essentially, he requires the ability to manipulate the non-human animal body in such a way that does not affect the non-human animals biological systems, maintaining normal behaviour as far as possible. David's particular experimentation is interesting in that the invasive nature of its methodology is only to test auditory capacity, rather than test treatments of cancers or other infectious diseases. Indeed, Anton is only at the laboratory because of David's high success level, or rates of survival, during the post-procedural stage. David's notoriety is born from this, that '[d]espite the nerves [David] cut, the red, blue and green wires he threaded across their skulls, just below their skin, or the electrodes inserted about their hearts, or on their rumps, [the birds] sang'.[541] Here, Torti highlights the paradoxes apparent within an empirical investigation looking to quantify and qualify the sensory value of a principally aesthetic singularity, being bird song. Through placing such conceptual opposites together, the physical imposition on sensorial ability, Torti offers a fictional scenario by which to reconsider the moral implications within the scientific principle of the ends justifying the means.

At the end of the procedure, the finch dies due to an unspecified adverse effect of the surgical implantation. Prior to dying, the bird's body is reformed as 'David positioned the probe in place and began to sew up the bird'.[542] Shortly afterwards, 'David looked down at the bird again […] He pulled the bird from the anaesthesia funnel. Anton stepped back. Rebecca rushed toward them. The bird lay limp on the table'.[543] Ultimately, the implanting of foreign materials to the non-human animal body causes it change into something *other*, contaminated by devices of human empirical design and so arguably not a true representation. The physicality of the vivisection procedure contrasted against the cerebral death of the bird proposes an ambiguous insinuation

[541] *Ibid.*, p. 40.

[542] Torti, p. 41.

[543] *Ibid*.

to factors unseen, or unprioritized, by scientific pragmatism. Torti suggests that pain and trauma cannot be quantified and qualified in such a way as to always guarantee survival, that something *more* than the physical is irreversibly altered during the procedure. Certainly, David is totally confused, remarking to the others: 'I've done that surgery a thousand times […] It doesn't make any sense'.[544] What does not make sense to David is that *Red 31*, according to empirical science, was indistinguishable from past subjects and presented no new variables to justify the unsuccessful outcome.

Its death installs *Red 31* with an ambiguous individuality, having directly contradicted the surgical methods developed to ensure survival and thus the continuation of the experiment. This is something that empirical practices look to nullify as an influential variable, as it would threaten the validity of both the investigation and make redundant universal practices that rely on duplicity. Due to his scientific empirical sensibilities, David never considers there to be an issue with the centralised technique by which to perform this mode of invasive surgery, as it has been determined to guarantee survival. Instead of going against the founding principles of reliable refutation and conjecture, David blames the finch, not the peer-reviewed, legally ratified procedural methodology. Torti's fictional strategy here intervenes to propose David is incorrect, the fiction working to re-autonomize the finch as having the ability to disrupt scientific systems of knowledge production through an element of animism that is unobtainable in terms of scientific determinations and control. For David, the cause lies with an imperceptible agency of the individual finch, it being simply '[i]nfuriating how quickly a zebra finch could go'.[545] Through this fictional scenario, Torti challenges empirical notions of replicability in the non-human animal, the idea that no two experiments are ever truly duplicable.

Indeed, both David and Anton remain loyal to their learnt empirical methodology after the death of *Red 31*, as to them '[e]very death marked the premature end of an experiment, but some were particularly unfortunate, coming only days before the critical follow-up data had been collected'.[546] Even after death, the non-human animal only exists within the temporal logic of each empirical investigation, each untimely demise marking only the termination of a particular thread of enquiry and end of a resource. In contrast, Rebecca is the only character without any

[544] *Ibid.*, p. 42.

[545] *Ibid.*

[546] *Ibid.*

empirical predisposition, and looks to try and understand the ambiguity in the death of *Red 31*, remarking '[m]aybe it didn't want to be studied […] maybe it chose to [die]'.[547] A comparable ambiguity exists in Torti's own experimentation, mentioned only briefly in the scientific publication following the beak immobilization experiment, or the surgical restriction of beak movement:

> Beak manipulations provided additional and strong evidence for the contribution of beak movements to sound modification. Only one bird sang enough for quantitative analysis of beak gape during manipulations.[548]

Ambiguities stem from the fact that only one zebra finch sang following the beak immobilization experiment, the reasons for which cannot be purely biomechanical, as the singing finch proves the centralised surgical practice does not hinder singing ability. The empirical ramifications are that this avenue of enquiry is limited to single-subject results, rather than attaining a collective cross-sectional sample from which more comprehensive results pertaining to behavioural species trends can be gleaned. In terms of the non-human animal, the implication is that there are reasons as to why the other finches did not sing, introducing a variety of new potentialities that propose new modes of agency that rebalance systems of autonomy present in the encounter. For example, the finches perhaps did not sing due to intense pain or discomfort, post-surgical trauma, cognitive changes, environmental influences, awareness of foreign materials in their biological systems but rather, after everything, because they just did not feel like singing. The methodological ambiguities that arise in Torti's own experimentation correlate closely with those present at death of *Red 31* in the novel, during which Torti employs a fictional strategy by which to explore new potentialities pertaining to new modes non-human animal agency.

Certainly, Rebecca looks to charge the finch with the same sense of agency, restoring a fractional autonomy within a process where otherwise power lies only ever with the human scientific investigator, posing the question that maybe the bird '[c]hose to die'.[549] She argues that the bird, conscious of its own mortal situation and the fundamentally alien nature of the surgical alterations made to its being, made a deliberate choice. Naturally, this is rejected by David and

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[547] *Ibid.*

[548] Goller et al., p. 297.

[549] Torti, p. 42.

Anton as anthropomorphism, David chastising her for 'a common mistake, projecting human emotions and agency onto animals'.[550] Rebecca is then left alone, as she 'rubbed the black surgical table with soap and then followed with alcohol. She picked up the zebra finch, and put him on a paper towel on the counter'.[551] Rebecca's quasi-ceremonial cleaning of the surgical table signifies the end of the experiment. Her actions embody the scientific ideal that each investigative procedure exists within brief, self-contained temporal existences, separated from other procedures occurring before and those that follow, in order to ensure empirical objectivism and accuracy. For Rebecca, being the laboratory technician, her encounter with the finch continues beyond the official termination of the procedure and the surgical table, a space where only invasive permissions are permitted. Her non-scientific background allows for a reconsideration of the bird's death. For David and Anton, the bird ceases to exist in any capacity at the moment of death, as it signifies the end of its empirical usefulness. However, her encounter continues:

> Rebecca placed the zebra finch in her palm, its head drooping between her thumb and forefinger. His body was still warm, a warmth that was expressly unsettling because she knew it was temporary. The hyperactive bird had been stilled and silenced. She held him closer and blow on the soft orange cheek feathers and then smoothed them down again with the tip of her finger. Why did she feel sad? […] She couldn't say, but she knew death could be a choice.[552]

Rebecca is the narrative construct by which Torti can leave the reader in the room with the dead finch, experiencing its motionless yet still affecting presences. Torti's is a fictional interpretation of how bodies could nevertheless influence and interact in the surgical space once the non-human animal is deceased.

Haraway's *When Species Meet* is worth introducing here as it elaborates on Rebecca's emotional reaction to the bird's death in *Cages*. In *When Species Meet,* Haraway directly challenges human tendencies toward justification and ratification of death, proposing the more plausible command should be 'Thou shall not make killable'.[553] Particularly, Haraway offers the

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[550] *Ibid.*

[551] *Ibid.*, p. 43.

[552] *Ibid.*, p. 45.

[553] Haraway, *When Species Meet*, p. 80.

conceptualisation of a shared suffering between humans and non-human animals within the laboratory space, occurring between researcher and subject. To this end, she propositions a reconsideration of legislative ratifications of pain and the act of killing:

> [R]eal pain, physical and mental, including a great deal of the killing, is often directly caused by the instrumental apparatus, and the pain is not borne symmetrically. Neither *can* the suffering and dying be borne symmetrically […] these practices should never leave their practitioners in moral comfort, sure of their righteousness […] The moral sensibility needed here is ruthlessly mundane and will not be stilled by calculations about ends and means. The needed morality, in my view, is culturing a radical ability to remember and feel what is going on […] to respond practically in the face of permanent complexity not resolved by taxonomic hierarchies and with no humanist philosophical or religious guarantees. Degrees of freedom, indeed; the open is not comfortable.[554]

Haraway exposes the social and technological constructs that justify the human systemized killing of non-human animals. She continues to highlight the importance of remaining conscious, facing the undesirable realities of killing; always without excuses.

In *When Species Meet*, Haraway draws from Derrida's ontological considerations of non-human animals, particularly his theoretical explorations into human moral responsibilities.[555] Within his approach, Derrida recognises that the treatment and killing of animals is justified by ideologies born from an absolute belief in human exceptionalism. This, in turn, forms an unbridgeable gap that forever separates the human and the non-human animal. Haraway observes that 'Derrida remembers that in this gap lies the logic of sacrifice, within which there is no responsibility toward the living world other than the human. Within the logic of sacrifice, only human beings can be murdered'.[556] Haraway draws attention to legal mechanisms that allow for the deferral of moral outrage pertaining to the killing of non-human animals, so long as it occurs within a demarcated empirical space. She goes on to introduce two key concepts, the logics of substitution and scapegoating:

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[554] *Ibid.*, p. 75.

[555] Derrida, '"Eating Well"', pp. 96-119.

[556] Haraway, *When Species Meet*, p. 78.

> [A]nimals are sacrificed precisely because they can be killed […] The substitute, the scapegoat, is not Man but Animal. Sacrifice works; there is a whole world of those who can be killed, because finally they are only something, not somebody, close enough to "being" in order to be a model, substitute, sufficiently self-similar […] but not close enough to compel response.[557]

Haraway charges these two concepts as being wholly indivisible with moral accountability. She concludes that if empirical science will use the non-human animal in such ways, then greater efforts at a shared suffering must be made, 'to do the *work* of paying attention and making sure that the suffering is minimal, necessary, and consequential'.[558] As the only non-scientific character in Torti's narrative, Rebecca's response contrasts with those of David and Anton, conversely highlighting characteristics of scientific empiricism that prevent or discourage both moral affect and emotive response. Rebecca's emotional reaction to the finch's demise becomes a moment charged with possibility that rebalances systems of autonomy that otherwise view the non-human animal as insignificant and materially disposable, encouraging other potential forms of affective encounter during these particular modes of human and non-human animal interaction.

Revitalising the Deceased Non-Human Animal in *Intuition*

Intuition also includes fictional instances of invasive surgical procedures, as Cliff looks to surgically dissect a mouse showing recovery symptoms, having been infected with the R-7 strain. However, unlike Torti's *Cages*, instances or invasive practice only occur after the non-human animal is euthanised after a period of gestation of cancerous tissue or tumours. The mouse is therefore non-sentient during invasive practice, killed through either anaesthesia or the breaking of the neck, and reduced down to biomaterial cell cultures and analysed to observe the effects of potential treatments. Intriguingly, Goodman installs Cliff with a rather contradictory sense of both empirical and empathetic logics. On the one hand, he is observed 'examining his mice, holding them up by the tail […] Those were results he held there by the tail'[559], and on the other, '[h]e hated the thought of breaking the bodies now so wonderfully cured. He had healed these animals

[557] *Ibid*., p. 79.

[558] *Ibid.*, p. 82.

[559] Goodman, p. 67.

[…] An overwhelming, woozy desire came over him to see the mice intact'.[560] Initially, Cliff seems to regard the mice as both cellular biomaterial and emotive beings all at once, though during the surgical procedure that follows, his scientific behaviour ultimately regains dominance. Naturally, Goodman is careful to acknowledge the paradoxical implications relevant to issues of empathy and care in invasive procedural sciences, as Cliff himself notes '[h]e had healed these animals. First he'd brought them close to death, and now he'd brought them back'.[561] The genuineness of Cliff's empathetic considerations of the mice is therefore questionable, initial impressions diluted and muddied by both his apparent narcissistic god-complex and the artificiality of the encounter created by the intentionality of the empirical methodology.

Cliff's killing of the mouse is a textual moment charged with agency on the part of the non-human animal, a final animation before becoming an inanimate *other*, or biomaterial. It is important to remember that the death of the non-human animal marks the beginning, not the end, of empirical processes reliant on dissection. Goodman describes:

> [Cliff] took just one mouse and put it in the clear plastic container that served as the CO^2 chamber. A simple hose fed into the isolator from a spigot on the wall. Cliff depressed the lever and CO^2 filled the sealed chamber. The mouse thrashed against the walls. Bred for timidity, the little creature still fought death; the animal was alive, and it wanted to live. But the thrashing soon ended. The mouse seemed to swell as it expired, growing heavier even as it struggled, until, weighted down, life and colour drained. The animal lay still, like a gray mouse statue on the bottom of the cage.[562]

Certainly, the killing of the mouse and its subsequent inanimation changes the conditions of the human and non-human animal encounter. Goodman accentuates the wholly inequitable nature of the power structure at play within empirical methodologies necessitates these designated endpoints. The ferocity displayed by the mouse expresses a desperation to escape its situation, a final futile grasp for autonomy within a system dominated absolutely by the human experimenter. The fictional moment of actual killing is significant as the mouse's actions are charged with a vivacious, innate desire to remain alive despite being selected for its supposedly timid behaviours.

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[560] *Ibid.*, p. 68.

[561] *Ibid.*

[562] *Ibid.*

The implication being that death and dying are always inescapable sources of inherent fear, entirely evasive to scientific modes of behavioural selection. This is achieved by expanding the temporal logics of the moment of killing, supposedly quick and humane, to instead include the mouse's desperate actions immediately prior to death. The result is the chilling proposition that there exists a moment when the mouse realises it is mortally threatened and thus *knows* it is going to die. These moments fall outside the legislative protections that instead prioritise the prevention of prolonged *types* of distress and pain. Goodman's fictional strategy thus offers a consideration of the inefficiencies and limitations of centralised terminal practices that extend from human-defined degrees of pain and discomfort. By fictionally reconstructing and extending the temporal logic of the killing process, a supposedly instantaneous event, Goodman offers new reconsiderations for moments of emotive response in the mouse, rather than moving from simply alive to then dead.

During Goodman's terminal event, the conceivable assemblage according to Bennett's vital materiality would therefore consist not just of Cliff, the mouse, and the CO^2 chamber, but also various invisible actants such as the intentionality of Cliff's actions, the nutritional energies present in the mouse, the electricity that operates the CO^2 chamber, and, crucially too, legislative regulatory frameworks.[563] Bennett's theoretical approach reinstitutes surgical practices with multitudinous contributors and possibilities for human and non-human animal encounter, never simply a human investigator operating on a deceased mouse body. The broader implication being that reconsiderations of fictional reconstructions of this same empirical practice can employ this conceptual approach to identify other potential moments in human and non-human animal encounters. Goodman's description thus suddenly becomes a far more multidimensional encounter, extending the bodily influence of the mouse beyond the limitations of insentience and presenting the opportunity for further mutual affectivity.

Following the terminal event, Goodman's narrative follows the mouse's body as it moves through the surgical process, in order to explore the potentialities for meaningful encounters. Certainly, the recent insentience of the mouse threatens to remove the non-human animal presence from the encounter entirely. Goodman describes Cliff's progression to the surgical stage:

[563] *Ibid.*, p. 30.

> Cliff carried the body gently in his gloved hand to the dissecting room. He turned on the examining light and placed the mouse belly-up on the thick polystyrene dissecting block with its disposable pad.[564]

Following Bennett's theoretical framework, the surgical glove, examining light, dissecting block, disposable pad, and the dissecting room are all now implicated as equal contributory actors within this particular assemblage, as well as the unperceivable influences that each object implies. When moving into the dissecting room, Cliff crosses into a space permitted special dispensation for surgical procedures on deceased non-human animals; that is its purpose. The procedural expectations of the designated space therefore potentially cause a change in Cliff's perceptions, a reprioritisation of the materiality of the mouse's body which is then further encouraged by the presences of specialised apparatus, such as the dissecting block and examining light. The surgical pad resonates poignantly in being single-use, one of numerous disposable resources that includes the non-human animal body. However, disposability invariably implies multiplicity, distinguishing Cliff's disposable pad, and thus the mouse that lays on it, as the latest in a chronological sequence that potentially stretches back to the creation of the dissecting room. Empirical protocol insinuates that the pad and the mouse are indivisible, as one cannot exist in the space without the other, and so a legitimate mutual history comes into existence. This subsequentially incriminates the dissecting room as a space with a new protracted temporal logic that orientates around a species history spanning years. This is entirely contradictory to the purposes of the dissecting room, intended to accommodate the short temporalities of resettable, repeatable and replicable surgical experiments, thus the empirical exactitudes of the space are compromised. The body of mouse *R-7* is synonymous with the re-imaginings of past rodent multitudes that have passed through the space, as they re-populate the dissecting room at the merging of temporal existences.

Bennett's theoretical framework also reconsiders the emotive influences of each interaction between primary actors, isolating behaviours in order to examine motivations behind them and legitimising their position within the network as actants. For example, the action of Cliff carrying the dead mouse into the dissecting room consists of three primary actors: Cliff, the mouse body and the glove. However, another valuable and unperceivable actant that connects the three primary actors is the gentleness with which Cliff handles the mouse's body, opening up

[564] *Ibid.*, p. 68.

an array of new potentialities in the encounter. It would be easy to view Cliff's gentleness as simply to avoid damaging biomaterial rather than any sense of care, evident in his earlier narcissistic contemplations. Maybe it is the habitual result of learned scientific practices and appropriated behaviours. But is it really that simple? Cliff's behaviour could be influenced by imperceptible cues emitted by the inanimate mouse: the delicacies of its tiny body, the unnatural stillness of its being now in death, or even some reverberations of empathy.

What about the surgical glove? Certainly, the glove is representative of scientific insistences for cleanliness and decontamination, a synthetic barrier existing between Cliff and the mouse that prevents bodily contact and, more broadly, could eliminate potentially affective physical encounters. But then again, the glove still allows for moments of real affection, connecting Cliff's hand with the residual warmth of the mouse's body through its own material. Maurice Merleau-Ponty offers a productive conceptual approach through his notion of *reversibility*, or the potentialities that arise when one considers that touching is to *be* touched. He proposes 'an essence beneath us, a common nervure of the signifying and the signified, adherence in and reversibility of one another – as the visible things are the secret folds of our flesh, and yet our body is one of the visible things'.[565] Dan Zahavi elaborates on Merleau-Ponty's approach even further:

> The decisive difference between touching one's own body and everything else, be it inanimate objects or the bodies of Others, is that it implies a *double-sensation*. The relation between the touching and the touched is reversible, since the touching is touched, and the touched is touching. It is this reversibility that testifies that the interiority [felt from the inside of the body] and the exteriority [felt on the skin] are different manifestations of the same [body].[566]

Implementing Merleau-Ponty's reversibility approach, new potentialities begin to open up when considering the role of the surgical glove that still facilitate Cliff's touching of the mouse. For instance, it raises the question as to whether all the internal systems of the mouse ceased simultaneously, or could Cliff still feel further resonations of life within it. The glove consequently

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[565] Maurice Merleau-Ponty, *The Visible and the Invisible*, ed. by Claude Lefort, trans. by Alphonso Lingis (Evanston: Northwestern University Press, 1968), p. 118.

[566] Dan Zahavi, *Self-awareness and Alterity* (Evanston: Northwestern University Press, 1999), p. 107.

shifts from a preventative to accommodating force within the bodily encounter between the human and the non-human animal. Suddenly, valuable reconsiderations appear that rebalance relative systems of power and different kinds of agency in favour of the non-human animal participant during these encounters, though always relative to the limitations of autonomy imposed by empirical scientific systems on the non-human animal.

Such deliberations provoke a reconsideration of the period immediately after termination, as by including the role the inanimate or material it increases the chances for and potentials available in other *kinds* of human and non-human encounter. More accurately, how points of interaction between actors transform during the transition of the non-human animal from living to dead to accommodate new existences. Fictional strategies can help to explore this notion of transition, whether the non-human animal can still exist as an influential presence following death or, as their bodies grow cold, they simply become the material they are utilised for. Bennett's conceptual approach would encourage the dead non-human animal remains a significant presence, due to its commitment to inanimate political actors. When the new circumstances of the encounter are then renegotiated, is there a period of extension where emotive affection, present when the non-human animal was alive, resonate after the moment of killing?

Certainly Cliff's gentleness could be the emotive remainder of when the mouse was alive: a behavioural resonance symbolic of affective exchanges between two living beings. Goodman demonstrates that Cliff clearly detects *something*, whether it be consciously or unconsciously, still present in the mouse's body deserving of this particular behaviour. In Torti's *Cages*, Rebecca experiences a period of extended affection after the death of the zebra finch, as '[h]is body was still warm, a warmth that was expressly unsettling because she knew it was temporary […] Why did she feel sad?'.[567] The residual warmth of the deceased finch's body instigates the sense of loss, sadness, confusion, and doubt she now feels for the living non-human animal. The cessation of consciousness is the scientific determination of death, and yet, for Rebecca, the bird continues to exist in her own psyche, resurrected beyond the confines of its physical body, still able to affect her emotionally. However, unlike with Cliff, the death of the finch was not the intended outcome and so Rebecca is affected by different degrees of emotionality. It is difficult to imagine that any form of human emotionality would instantly shift to appropriate the dead non-human animal as simply inanimate matter at the precise moment of death, and so the implication of both fictional

[567] Torti, p. 45.

strategies is that the non-human animal continues to exist after the moment of death in some abstract way, defying systems of empirical absolutism.

After this period of transition following the killing of the mouse, Goodman proceeds to describe Cliff's dissection in meticulous and vibrant detail. She begins with the opening up of the mouse's body:

> He took four pins and pinned the mouse down, one pin through each paw. The mouse was stretched out now in death, its limbs taut, ears rigid, its two front teeth exposed, fierce in rigor mortis. With tweezers Cliff plucked the loose pink skin covering the mouse's abdomen, and then with small sharp scissors he snipper one vertical and four horizontal incisions, creating two neat rectangular flaps of skin to open and fold back. Cliff spilled no blood doing this […] He looked, instead into a clear, inviolate body. Here was the soft maroon heart, the size of a bean. Here the slippery liver, deep purple, its four flat lobes fanning out enormously as Cliff picked them up with his tweezers. Here the lungs. The kidneys, just the size of lentils. Here were the intestines, curled intricately together […] he'd never get them all back in again, packed as they had been.[568]

As the internal biological systems of the mouse are revealed, its internal organs are isolated and identified by Cliff, signifying the first stages in a process of scientific reduction that will eventually condense the mouse down into cell cultures and statistical biodata. As Cliff proceeds, the mouse moves further away from the living non-human animal being that was first placed into the CO^2 chamber, catalysing a perception shift in Cliff that aligns closer to considerations of biomaterial. Goodman's description also includes a secondary commentary on Cliff's expertise at these invasive practices, the insinuation being that his practical success is most likely born from rehearsal and repetition over time. Cliff's surgical abilities therefore evidence a centralised procedure regulated by governing regulatory bodies, raising familiar paradoxical issues surrounding the regimentation of killing to protect non-human animals: that there is a right way to cut them open.

[568] Goodman, p. 68.

Bodily Manipulations: Unconscious Effect of the Experimenter

The learnt nature of surgical practice introduces a new form of temporal logic that exists here, involving Cliff's professional career and his learning to surgically operate on mice. Viewed retrospectively, Cliff's career becomes interspersed with past operations and thus numerous non-human animal existences become placed within the temporal logic of his practical development, evident now in his competent surgical skill. The *R-7* mouse inhabits a dualistic role, both an individualised being but also placed within a temporal historiography of all the mice sacrificed and contributory toward Cliff's scientific learning. In *Cages*, Torti incorporates the same narrative device, as David remarks 'I don't know what happened. I've done that surgery thousand times' following the death of the finch *Red 31*.[569] Similarly to the mouse, the finch is situated at the end of a chronology of sacrificed non-human animals that have allowed David to develop his surgical skill. The added implication being that both Cliff and David may have, at one time, been prone to making mistakes before arriving at their surgical competency. The projected experiences of the non-human animal therefore become, contrary to scientific endeavours, more varied and unregimented as new potentialities open up due to reconsiderations of possible temporal existences. Crucially, the two narrative strategies implicate the human surgeon within the temporal existences of the non-human animals, being potentially hundreds of individuals, becoming perennial figures present at each individual moment of killing.

Returning to Goodman's *Intuition*, as Cliff's progresses the mouse *R-7* is further reduced down to the level of muscle tissue, seemingly threatening to remove the non-human animal presence entirely. Goodman describes:

> Cliff peeled open the flaps of skin and began to pin them to his dissecting pad. Red blood vessels threaded the pink translucent skin, the vessels clustering at the mouse's five pairs of mammary glands. Cliff picked at the skin with his tweezers and exposed each gland, and each gland in turn was normal size, the pattern of the blood vessels normal and undisturbed.[570]

[569] Torti, p. 42.

[570] Goodman, p. 69.

Cliff's biological observations move from individualised, recognisable viscera to the intricacies of muscular tissue and specific facia; the mouse's body is studied now at the micro-level of empirical examination. Delving deeper into the mouse's biological composition, Cliff's use of unfamiliar and exotic biological terminologies prompts a sense of disassociation; the reader is further removed by the exclusivity of knowledges permitted to him through the empirical vernacular. His account of vessels and glands, mentioned now in place of the heart and lungs, translates the non-human animal body according to scientific determinations and intensifying the sense of ethnological distance. The more specific the terminologies, the further away the reader is taken from the recognisable non-human animal presences in the encounter. Indeed, the mouse is continually being separated and divided into its working parts, literally and figuratively, as Cliff's empirical training applies a mechanomorphic approach to its internal biological system. As the parts are named and multiplied however, the assemblage of influential actors adapts to accommodate the materials that make up the mouse body, increasing the chance for affective potential in the deceased non-human animal.

Upon finding no initial trace of cancerous tissue or tumours, Cliff begins to realise the potential in his *R-7* vaccine treatment:

> Cliff's heart began to beat faster. Over and over, he traced the faint red lines of the mouse's blood vessel, the map of the animal's body, the hairsbreadth rivers that extended from each mammary gland throughout the skin […] He had never seen anything more beautiful or more important than that mouse before him on the table […] The threadlike blood vessels did extend in Cliff's imagination. They seemed to spread into infinite patterns and possibilities, aligning and realigning themselves against cancer. Against death […] Here was the way forward. Here was the human body writ small.[571]

Once again Goodman refers back to the cartographic imaginary evidenced earlier and uses the loaded-value words *beautiful* and *important* to charge the mouse's body with a sense of consequentiality for human systems of knowledge. Indeed, the passage ends with the mouse as an analogy of the 'human body writ small'; the non-human animal body directly charged with the promissory future for human health. Cliff's moment of epiphany signifies a change in Goodman's

[571] *Ibid.*

narrative strategy, one that moves away from more systematic observations of itemised organs or tissue. Goodman emphasizes Cliff's excitement at his new discovery through intimations of his emotional reaction, his provocations of beauty, and hybridization of scientific realisation with the potentialities depicted in Cliff's own imagination. Intriguingly, the lifeless form of the mouse, whose biological systems have ceased entirely, is juxtaposed against Cliff's own visceral bodily reaction in the heart palpitations he experiences. Having meticulously isolated and identified each of the mouse's internal organs up to this point, Goodman now accentuates a sense of interconnectivity between tissue and emotive response, delivered through her depiction of Cliff's heart racing. Consequentially, the mouse becomes retrospectively charged with the same notions of physical emotionality, Goodman proposing a kind of creaturely continuity existent between Cliff and the mouse. The association is therefore made that the mouse experienced the same kinds of emotive responses when alive, its heart beating quicker during periods of emotional exhilaration too. Therefore, the wider implication of Goodman's strategy is that the internal organs and tissues of non-human animal bodies, when dissected, can be fictionally recharged with the same emotionality that animated them in life.

There is also another key dualism at play here, following Cliff's excitement and the noticeable transformation of his perspective toward 'that mouse before him on the table'.[572] Whether Cliff still sees the mouse as a single body, or a summation of cancer-free tissue and biomaterials remains ambiguously presented and therefore the mouse assumes a multiplicity of existences. The mouse is simultaneously a former sentient being, an inanimate dead body, a collection of key organs, a selection of tissue and blood vessel samples, as well as intrinsic cellular data and, crucially, Cliff's own statistics and results. Cliff's regard of the mouse is certainly determined by his empirical behaviours, his scientific imagination starting to 'spread into infinite patterns and possibilities, aligning and realigning themselves against cancer […] as he looked at the normal, healthy corpse before him'.[573] The oxymoronic phraseology here emphasizes the fundamental logics of sacrifice at play, that encounters are driven entirely by the promissory futures of human health, or as Cliff remarks, 'the human body writ small'.[574] The mouse is undoubtedly the source of Cliff's impending success, but only ever insofar as it provides the biological framework inside which to test his new vaccination. Instead, he is never under any

[572] *Ibid.*

[573] *Ibid.*

[574] *Ibid.*

methodological obligation, other than the specific ethical practices of killing, to consider the cognitive or emotive processes that make-up the non-human animal being. Here, Goodman's narrative strategy provokes a retrospective reconsideration of when exactly the mouse ceased to be a mouse: at the moment of killing, the post-surgical destruction of its body, the moment it entered the laboratory space, or whether it ever actually stops being a mouse at all. Goodman's aim is not to finally identify this moment, but to rather highlight the ambiguities present in selective scientific processes that authorise and facilitate permanent alterations to non-human animal identities and existences.

Like *Intuition,* Torti's *Cages* offers a fictional exploration of the affective biases of the experimenter during human and non-human animal encounters, most prominently through the character of Anton. Unlike David who, rather paradoxically, 'came to neuroscience through a love of birds and their song', Anton's motivation is just 'to understand circuitry and wiring of memory', and personally he 'didn't like them much. Plain and simple, though they'd been a constant presence in his life'.[575] Torti elaborates on the preferential characteristic of Anton's character to such an extent that it affects his bodily encounter with the birds. Here, Torti employs a narrative strategy that works to invocate scientific principles pertaining to the disavowal of embodied connections with non-human animal subjects during experimentations, as Anton notes:

> He avoided looking at their eyes and at the sloughing epidermis where their beaks met their faces. He didn't like the scaly feeling of their spindly legs or the way their toes sometimes curled around his pinky finger when he held them. He didn't like the feeling of their quickly beating hearts or warm bodies in his hand, and the truth was, he resented them deeply when they died.[576]

Undoubtedly, Anton's indisposition toward working in close proximity to birds introduces new implications regarding the human and non-human animal encounter here. His disinclination influences everything from the more intimate, such as body language, behaviour and bodily movement throughout points of contact, to the ideology that determines his fundamental view of birds as existential beings. Certainly, this opens up numerous potentialities in the experience of the birds themselves during these points of encounter. Torti's fictional strategy here allows for

[575] Torti, p. 53.

[576] *Ibid*.

a reconsideration of the ways in which the birds may perhaps be responsive to the subtle indications of Anton's aversion: an abruptness of movement, variations in handling, hesitation or even negligence. This resonates poignantly with Despret's conceptual approach concerning the articulation of bodies, a crucial source of evidence for human and non-human encounters in invasive surgical practice, being perhaps the only form of reciprocal exchange that occurs there.

Anton's personal indifference to birds is underlined at a moment of revelation, as he 'began sketching the syrinx, the bird's voice box, imagining how it might be possible to temporarily keep it from vibrating, devising how he might be able to mute a bird'.[577] Anton's own emotional detachment allows him to identify this particularly extreme avenue of enquiry that would perhaps of otherwise evaded those with a greater inclination toward birds. The nature of the experiment is made all the more poignant as it confiscates the bird of something fundamental to its very nature; birds being as universally synonymous with singing as they are with flying. Nevertheless, his objectivity steers him toward a mechanomorphic reduction of the bird's physiology:

> He looked back at the drawing of the bird's syrinx again, and suddenly he saw it. If he could keep the labia from moving, then theoretically there should be no sound […] He jumped from his chair and went to fetch a zebra finch.[578]

Anton's investigative decision is immediate, and the existential future of the finch is decided instantly due to the ultimate autonomy of the investigator, procedural permissions of the laboratory and easy accessibility to resident non-human animal populations. Crucially, Anton views the finch as being indistinguishable from other disposable scientific resources and so does not hesitate to satisfy his methodological curiosity. Following the surgery, Anton 'cleaned the table and tidied up the instruments. He wouldn't say anything to David. If it worked, he would have to see that this was the definitive test'.[579] It is insinuated that if the process is unsuccessful and the bird dies, Anton will not mention the procedure to David, consciously denying the existence of the finch and exploiting scientific logics of sacrifice. Therefore, the wider implications of Torti's fictional strategy, endowing Anton with a sense of scientific indifference toward the

[577] *Ibid.*, p. 56.

[578] *Ibid.*, p. 57.

[579] *Ibid.*

birds, is to imply that the inclinations of individuals can profoundly influence the experience of the non-human animals during encounters within this scientific situation.

Conclusion

This chapter has analysed the ways in which in Torti's *Cages* and Goodman's *Intuition* fictionally represent non-human animals within the laboratory setting implemented in invasive surgical practices. To provide a foundational understanding of epistemological logics active in this specific laboratory situation which could then be compared against fictional representations of the same conceptual features and methodological practices, an overview of the protective legislation that facilitates scientific ratifications of pain and killing of non-human animals was included. This established, analyses then turned to the ways in which contemporary literary strategies can re-autonomize and reanimate non-human animal presences following the point of inanimation and killing, stages representing the relegation of the non-human animal to biomaterial. Here, the chapter drew from Bennett's *vital materiality* framework in order to open up the invasive surgical space in such a way that rebalanced non-human animal presences and reconsider the opportunities for valuable interspecies encounters still occurring during these procedures and practices. These conceptual approaches were applied to demonstrate how contemporary literary strategies can negotiate investigative methods in which human temporal and autonomous control are absolute. Investigative value in such a literary critical approach lies in its offering a more multi-dimensional interpretation to importantly reconsider potentially affective interspecies encounters still occurrent in this unique scientific environment.

Concluding Remarks

This thesis has argued that contemporary literary representations of the non-human animal in empirical scientific settings can effectively contribute toward post-humanist reconsiderations of scientific empiricism and its systems employed to produce knowledge on non-human animal life. Through its critical analytical approach, the thesis has shown ways in which contemporary fictional strategies can negotiate and navigate operational epistemological logics, functioning differently from one scientific situation to another, in order to highlight conceptual oppositions in methodological practice and reconsider the role of the non-human animal more broadly. In addition, it has also demonstrated how fictional reimaginings of the human and non-human animal encounter within the scientific setting offer a far greater multidimensional interpretation of the potentialities that arise during interspecies interaction, restoring elements of non-human animal agency otherwise denied by predeterminations regarding their situational circumstance. Deliberations have continuously taken the non-human animal seriously, considering them as contributory and participatory to equally the production of scientific knowledges and human and non-human encounters that empirical science engenders. The thesis has maintained that contemporary fictional interpretations of the empirical scientific space can effectively and legitimately contribute to considerations pertaining to the multitude of culturally similar, yet methodologically dissimilar, scientific situations that host innumerable and valuable human and non-human animal encounters, informing posthumanist interspecies relations.

Analyses have been facilitated in part due to the nature of the contemporary texts chosen to demonstrate the capacity of fictional strategies to represent and reconsider non-human animals as valuable contributors to knowledge production and interspecies encounters within the empirical setting. The thesis has sought to demonstrate the fertile ground in contemporary fiction directly engaging with non-human animal presences in not only the broader empirical sciences, but the complex sub-variations of scientific settings and reconsider their experiential existences. It emphasizes valuable literary contributions to recent posthumanist re-visitations to and reconsiderations of scientific empiricism as a predominantly humanist concept which produces specific *kinds* of knowledge regarding non-human life. As such, fictional instances explore the limitations of empirical science to accurately represent non-human animal life, highlighting key conceptual oppositions and paradoxes apparent within working methodologies to contemplate

the potential for other forms of knowing or rebalancing systems for interspecies productions of knowledge.

Chapter One began with an analysis of how William Boyd's *Brazzaville Beach* fictionally represents field-based scientific practices as a critique of its operational epistemological logics that ultimately dictate the *kinds* of knowledges produced on non-human animal life. Boyd's novel was examined against Donna Haraway's conceptualisation of the empirical sciences as social construction susceptible to cultural and social change. The chapter introduced the logics of temporality that featured throughout the thesis, accentuating the ways in which scientific empiricism operates in specific demarcations of time. Boyd's literary strategies were then evidenced to encourage a reconsideration of field-based practices and the operational systems of knowledge production implementing non-human animals. Specifically, the chapter focused on formations of scientific paradigms, interpretive flexibility, the issues of ownership, and the tensions that arise between old and new knowledges concerning on non-human animal life. The productive potentialities of this chapter's critical analyses demonstrated the ways contemporary authors can effectively navigate, present, and accentuate working epistemological logics of the setting to consider the experience of both the non-human animal and human researcher and the interspecies encounters engendered there.

Chapter Two focused on the fictional reconstructions of the laboratory space, elaborating on preliminary understandings of empirical practices introduced in the previous chapter. The chapter read contemporary reimaginings of the modern laboratory featured in Colin McAdam's *A Beautiful Truth* and Karen Joy Fowler's *We Are All Completely Beside Ourselves*, with both texts including fictional representations of the laboratory, based around the cognitive behavioural studies and biomedical experimentations conducted on chimpanzees. The chapter then examined the ways in which fictional strategies bypass epistemological logics that allows the laboratory to operate as a hermetically sealed off and autonomous space. Implementing theoretical approaches of science sociologist Bruno Latour, the chapter focused specifically on the broader, more general epistemological logics at work within the laboratory, predominantly those that influence the non-human animal experiential existence. Empirical features included systems of autonomy, issues of temporality, and installations of visibility and invisibility, among others. The chapter provided an overview of the laboratory situation and its epistemological logics,

anticipating the ensuing examinations of other, more specific sub-divisions of laboratory practices throughout the next two chapters.

Chapter Three analysed how three fictional short-stories explored the conceptual oppositions apparent within experimental comparative developmental studies; Lydia Millet's 'Love in Infant Monkeys', Karen Joy Fowler's 'Us', and Ursula Le Guin's 'Mazes'. All three texts offered alternative literary strategies by which to effectively portray the sheer variety and multitude of non-human animals employed in short-term psychological experimentations, demonstrating alternate literary strategies by which to navigate and represent an empirical situation reliant on multisubject investigations. The chapter outlined inherent challenges facing contemporary authors, including issues of autonomy, methodological systems of separation, and different, more stringent, manifestations of scientific temporal logic. Supportive theoretical approaches of Vinciane Despret were also employed, particularly those regarding the effect of the experimental situation on interspecies encounters, as well as introducing the potential value of anecdotal evidence and how non-human animals respond to *other* questions, subliminal to those that scientific investigators believe they are asking. The chapter highlighted contemporary strategies that are able to rebalance non-human animal agency within scientific systems of autonomy and bodily separation, working against operational constructs that threaten to quieten or completely silence non-human animal presences. Reading these three fictional examples through such a critical literary approach demonstrated how contemporary authors can open up this laboratory scenario and offer new potentialities pertaining to interspecies encounters occurring during and around scientific investigations there.

Lastly, Chapter Four focused in on representations of non-human animals implicated within the laboratory setting employing invasive surgical practices as the fundamental system of knowledge production. The chapter analysed the ways in which in Torti's *Cages* and Goodman's *Intuition* fictionally signify scientific justification of pain, discomfort, and the killing of non-human animals. Considerations incorporated Bennett's *vital materiality* framework into readings of the fictional material to frame invasive surgical practice in such a way that rebalanced non-human animal presences and reconsider opportunities for valuable interspecies encounters still occurring during procedures and practices that exalt materiality. These conceptual approaches were applied to demonstrate how contemporary literary strategies can negotiate investigative methods in which human modes of temporal control and autonomy are organised in their most

stringent forms. Analyses turned to the ways in which contemporary literary strategies can re-autonomize and reanimate non-human animal presences following the point of inanimation and killing, stages representative of processes that render the non-human animal into biomaterial. Potential investigative value of such a literary critical approach lies in representations of a more multi-dimensional human and non-human animal encounter, and reconsider the affective moments still occurrent in this scientific situation.

Taken together, these four chapters have allowed the broader thesis as a whole to look across different scientific settings and attend to the specificities of each empirical situation, thereby contributing to the store of literary animal studies accounts regarding the empirical sciences and human and non-human animal relation in fiction by adding complexity and comparative understanding, demonstrated by the investigations laid out in each chapter. Rather than survey many instances in contemporary literary fiction to achieve its goals, the thesis has focused on important texts in detail because of the depth and focus of their interest in alternative scientific settings. The chapters have showcased different literary strategies by which to navigate the subtle nuances and variances between epistemological logics and empirical methodologies, opening up the scientific setting to consider the non-human animal experiential situation in addition to the human and non-human animal encounters and interactions that occur there. This thesis hopes to demonstrate the great potential in contemporary literary fiction to accurately represent non-human animals caught within systems of knowledge production throughout the empirical sciences. These fictional narratives should be taken seriously in terms of their ability to contribute to posthumanist re-evaluations and reconsiderations of the empirical sciences as the definitive mode of producing knowledge on non-human animal life. Most importantly, they encourage other modes of interspecies affection, alternative ways of *knowing* that are equally and legitimately as valuable as those made through empirical practice and actually, when it comes to evaluating our current treatments of and determining our future relationships with non-human animals, that is enough.

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