

Toward the Interested Investigator:
Examining the Epistemic Dimensions of Relational Theory in Zoology

by

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A thesis
presented to the University of Waterloo
in fulfillment of the
thesis requirement for the degree of
Master of Arts
in
Philosophy

Waterloo, Ontario, Canada, 2023

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

I argue in this thesis that a research approach that is based on a meaningful relationship between a zoologist and their study subject holds unique epistemic value. It has been well established by feminist and social epistemologists that the identity and interests of the knower significantly influence the way knowledge can be created. This has been applied in philosophy of science to recognize that the identity of the scientist significantly influences the way they create scientific knowledge. Relational theorists draw our attention to the uniqueness of relationships *themselves*. I seek in this thesis to draw our attention to the potential epistemic influence of relationships *themselves* in the creation of scientific knowledge in biology. I do this by bringing together relational theory and epistemologies of ignorance to understand how scientists might influence knowledge creation in biology. I do this with a specific focus on zoology.

In Chapter 1, I perform a literature review of relational theory and its applications in the philosophy of biology. I argue here that relationality presents a fruitful axis for analyzing research and knowledge creation in zoology. Next, in Chapter 2, I present what I call a researcher's "state of interest toward relationality". I argue here that relational theory can be used to differentiate research approaches used by zoologists. I do this using two case studies: that of Jane Goodall's research program with chimpanzees and Eugenie Clark's research program with sharks. Finally, in Chapter 3, I use relational theory to analyze the creation of ignorance in zoology. I argue here that a research approach where a zoologist has a high state of interest toward relationality offers unique epistemic benefits by allowing zoologists to circumvent and/or respond to the creation of some forms of ignorance. I hope that by connecting relational theory with the epistemology of ignorance in biology, we may see ways that relationships can strengthen scientific research.

Acknowledgements

Before I begin, I would like to recognize and acknowledge that this thesis was prepared within the traditional territory of the Attawandaron, Anishinaabeg, and Haudenosaunee peoples, in what is known by some as Waterloo, Ontario. The places I live and work are situated on the Haldimand Tract, land granted to the Haudenosaunee of the Six Nations of the Grand River in a legal promise that is no longer being kept by settler colonial powers in Canada. It is important to act beyond performing acknowledgements of land. The work at hand talks about relationality in connection with concepts like love, care, interest, reciprocity, and respect, concepts which have received extensive scholarly attention in Indigenous philosophy. I approach these concepts through Western philosophy as a way of opening Western scientific academe up to the role of different values. It is with good intentions and an awareness of ethical space – i.e., the collaborative and respectful space between worldviews, as shared by Algonquin elder Larry McDermott – that I enter this scholarly analysis.

I want to share my deep gratitude for those who have supported me in writing this piece. This research is supported in part by the Social Sciences and Humanities Research Council of Canada. I am grateful to the Department of Philosophy at the University of Waterloo for offering such an open community. Thanks go to my community of friends in Waterloo who offered encouragement and reprieve from my computer screen: Erin, Solène, Haley, Findley, David, Andree, Victoria, Maddy. Thanks of course to Carla for taking a chance on a science kid with little philosophical training; this science kid appreciates it. I am

also grateful to my family for everything. And, last but never least, thanks to Caleb: you, the bats, and the salmon helped me see a way forward even when I was lost.

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Preface

*In the kitchen, one diver begins to tell a story
of his youth: sea turtles surging to shore*

by the hundreds, gouging sand with muscled flippers to lay their eggs.

*They arrived by night. And at the end of the nesting season,
they'd capture a turtle as she circled back to the sea. Cleave*

*her throat, hold a cup to catch the blood and drink
before cracking the plastron and removing the meat.*

Not what he says, but how he says it.

He speaks as if this was an act of love.

– Katherine Larson, “Ghost Nets / II”

Norms within many natural scientific fields encourage scientists to take a removed, uninterested, value-free, unbiased view of their work. These norms say that through the uninterested eye, we – humanity, scientists – may practice more rigorous science and create more accurate knowledge. Results ought to be analyzed through reason alone, data ought to be collected without extensive interpretation, and communications ought to share only the strictly objective elements of research. Creativity and enthusiasm may be permitted when developing lines of inquiry, so as to reflect the curious nature of the research endeavour; anything beyond that is not appropriate.

Perspectives in the philosophy of science, however, have started to move past this ideal in which scientific work is free of values. Creativity and curiosity are often clear in how scientists discuss their work. And, in reality, it is difficult to completely remove a scientist's driving values, interests, and enthusiasms from the research they perform. Katherine Larson's (2011) poem above talks of love (or something like it) and how it shapes the experience of harvesting a sea turtle: "Not what he says, but how he says it." I am interested in something similar in science, and specifically biology. How do feelings of involvement, respect, or even love factor into biological research? Biologists know that their work engages with other living things and, for many biologists, their interest in living things are what pushed them toward the discipline in the first place. My intention in this thesis is to contemplate how a researcher's interest in their study subject might influence the way they create knowledge. I do this with a focus on zoology.

I make four novel contributions to philosophy in this work. My focus is on arguing that a research approach that is based on a meaningful relationship between a zoologist and their study subject holds unique epistemic value. In "Chapter 1: Understanding Relational Theory" I review the relationality literature. I seek, in this first chapter, to understand what "relational theory" refers to, and to identify how relational theory has been used to understand relationships between human and non-human animals.

In "Chapter 2: Mapping the Scientist-Subject Research Relationship", I pinpoint one sort of relationship that exists in zoological research: that between the researcher and the animals they study. I use this to develop an account of what I call a researcher's "state of

interest”, which I develop in terms of relationality (i.e., to describe a researcher’s state of interest toward their relationship with their study subject); *this is my first contribution*. I use researcher “state of interest” to contrast two different approaches taken up by zoologists: one with a high state of interest toward relationality and one with a low state of interest toward relationality.

In “Chapter 3: A Relational Approach, Knowledge, and Ignorance in Zoology”, I investigate how a research approach in which a zoologist has a high state of interest toward relationality might influence the way they create knowledge. I specifically outline ways that this research approach may help a zoologist navigate or respond to the creation of seven different types of ignorance. Here, I understand the creation of ignorance (i.e., the epistemology of ignorance) in science in a new way by using relational theory as a guide; *this comprises my second contribution*. In doing this, I make *my third contribution* by applying relational theory within the philosophy of science, thereby extending where and how relational theory can be used in philosophy.

All in, I attempt to clarify how the relationship between a scientist and their study subject might support knowledge creation. In my *fourth contribution* to the philosophical endeavour, I demonstrate that it can be beneficial for scientists to hold and recognize close, and potentially affect-laden, relationships with their study subjects. My hope is that this will help clarify the ways that an *interested* investigator can uniquely support scientific endeavours.

Chapter 1:

Understanding Relational Theory

Humans are social creatures. The relationships we develop with others are foundational to our everyday lives. Relationships can be loving, fraught, bitter, nourishing, and dangerous – sometimes all at once. The connections I make with others are important to who I am and what I do. Understanding the relationships humans make can provide valuable insight into who we are, what we do, and why we do such things – collectively and individually. Indeed, scholars across multiple disciplines are interested in the nature of relationships. Different fields of philosophy have taken up many kinds of questions to do with our relationships. For example, some scholars of political and social philosophy are concerned with relationships between and among individuals and institutions. Liberatory turns in these fields are increasingly concerned with the dynamics of different kinds of relationships (e.g., dynamics of power). And, recent feminist and social turns in epistemology have allowed scholars to orient themselves to the role people and their relationships play in the creation of knowledge.

In the project at hand, I am interested in the role human relationships might play in the scientific enterprise. I am curious: What relationships are at play in scientific research programs? How might they affect the creation of scientific knowledge? I am interested in a particular sort of relationship: the relationship between a scientist and their study subject. To begin an answer to these broad questions, I turn to relational theory as an analytical tool. But

it is not easy to nail down all of what is meant by “relational theory.” What *is* this tool? What are its foundations?

Here I undertake a review of the philosophical literature on relational theory, broadly, and relational theory as it applies to interactions between humans and non-human animals. I am interested in understanding the relationality between humans and non-human animals in zoological research, i.e., the relationality between scientists and study subjects. What, if any, moves have been made to apply relational theory to questions in the philosophy of biology, or even in biology itself? I argue that relationality presents a fruitful axis for analyzing research and knowledge creation in zoology.

I start this review broadly by laying out the recent development of relational theory especially as it has been altered and applied within Western, (primarily) Anglophone feminist philosophy. I begin in section 1.1 by developing what I mean by “relationality”. This includes my chosen phrasing, an overview of feminist relational theory, the concepts associated with relational theory in its more basic form, and the main spheres of philosophical research that draw on relational theory. My focus here is on defining “relational theory” as work that pays attention to *relationships themselves* and the unique role of relationships in human theory and practices. I introduce four accounts of relationality that I use in chapters two and three: Lorraine Code’s “second person” view of relationality, Jennifer Nedelsky’s view of social and political embeddedness, Jean Keller’s “moral agent” view of personhood, and Susan Sherwin and Katie Stockdale’s view of relational theory as an umbrella term.

After starting with a broad view of relational theory, I isolate how the importance of relationships themselves has been applied to human-non-human animal relationships in biological research. I kick-start this in the final part of section 1.1 by outlining how relationality has been applied in philosophical research on non-human animals.

In section 1.2, I add fundamental concepts from feminist philosophy of science as a way of expanding our possible use of relational theory. I outline the connections between feminist theory and philosophy of science, then apply those to biology to provide a sketch of what feminist philosophy of biology looks like. These concepts will allow me to work horizontally between literatures on relational theory, philosophy of biology, and theoretical biology. Feminist philosophy of science creates a bridge between previous uses of relational theory and biology. This bridge will help me isolate whether and how relational theory can apply to zoological research in section 1.3.

In this final section, I provide a closer look at how relationality has been applied in the philosophy of biology. I additionally offer some instances of relationality in biological work that differ from relational theory as outlined here. I identify a gap in how relationality has been applied to zoology. I introduce Lynda Birke's use of relational concepts to understand how the concept of "the animal" is defined in Western scientific circles. Birke's work forms an important foundation for how relational theory might be applied to biology. I aim to build on this work by connecting relational theory with the creation of ignorance within biology, which I do in chapters two and three. In Chapter 2, I will briefly explain

relevant works from social and feminist epistemology and work on value neutrality in science. In Chapter 3, I briefly outline relevant literatures on the epistemology of ignorance.

1.1 What I talk about when I talk about relational theory

There are multiple different ways that the word “relation” is used. The one I focus on here is “relation” as a type of connection between two or more parties. I have a relation or connection or bond to my mom that is genetic, but also loving, intellectual, and material. I also have a relation to my neighbor across the street where we recognize each other but are otherwise removed from each other’s lives. Through this project, I aim to analyze the connections between human and non-human animals, or the relations and relationships between human and non-human animals. The terms “relational” and “relationality”, then, are modifications of the root “relation”. “Relational” allows us to describe something in terms of relationships and “relationality” refers to the feature of being relational itself.

I have made an intentional choice to develop this work in terms of “relations”. Another phrasing that is used in the academic literatures of multiple disciplines, but which often refers to the same kinds of things I am concerned with here, is that of “kin” and “kinship”. I have chosen “relation” rather than “kin” partly because of how each concept is situated. Both concepts feature across philosophical traditions. Still, Western philosophies tend to discuss the concepts I analyze here in terms of “relationality”, while many Indigenous

philosophies include relationality and associated concepts within discussions of “kinship”.¹ My aim in this project is to analyze connections between human and non-human animals through the Western philosophical tradition, so I use the terms primarily used within that tradition.

The slightly different histories and contexts of these terms also means that a foundation based on “relation” offers a broader scope for some audiences. This is important for developing an analytical tool that will be applied cross-disciplinarily. “Kinship” can refer specifically to familial relationships. In some philosophical traditions, this familial meaning is a central part of the underlying metaphysical assumptions made by a knower (e.g., as explored by Meyer & Oliver, 1998; Tynan, 2020). In both Western science and philosophy, however, the familial meaning of “kin” may constrain how an associated analytical tool may be used (i.e., how a “kin theory” is used). To a biologist, for example, “kin” may apply *only* to those who are genetic relatives. “Relationality”, then, is broad enough to capture relationships between and among genetically-related and non-genetically-related individuals. In the context of this project “relationality” remains the more apt choice but it is important to note that, in other contexts, other terms are used to discuss similar concepts.

¹ This is not to say that the concepts I take up here are the same across philosophies, different only in terms of phrasing. Nor is this to say that kinship is identical across Indigenous philosophies. For treatments of the complex meaning of kinship in some Indigenous philosophies, I recommend Kimmerer, 2017; Meyer & Oliver, 1998; Tynan, 2020; Whyte, 2021.

1.1.1 Feminist critiques set the stage

Relational theory as we see it today has roots in different philosophical fields but, more recently, developed rapidly via feminist views of human nature. In “Feminist Relational Theory” (2022) – the introductory article to the *Journal of Global Ethics*’ special issue on relational theory – Koggel *et al.* give a sketch of how feminist relational theory has developed. They recognize that humans have been described as “essentially social” (2022, p. 1) across many kinds of philosophical scholarship, including Ancient Greek, African, and Asian philosophy, and in some work by Modern Europeans. Talk of relationships and the recognition that humans are social is not new. However, theoretical use of “relationality” has grown in reach within Western philosophy, to the point that the concept can now be offered as a theoretical tool with a history of applications already in hand.

Relational theory especially matured through feminist critiques of the Western liberal view of humans as atomistic individuals. Such critiques can be seen in some feminist approaches to social and political philosophy and moral philosophy of the 1980s and 1990s. Lorraine Code’s (1987) article “Second Persons” presents the foundational aspects of these critiques. In this work, Code questions the view of what she calls the “autonomous man”, a view of personhood that she sees as driving the structure of ethical and epistemological thought at the time of the article. The autonomous man refers to an abstract ideal in which humans are independent, self-sufficient, self-reliant, self-realizing, self-interested, and driven by personal gain. For Code, the autonomous man is an ideal that is obsessed with the view of persons as islands, to the point that it raises problems for moral and epistemological thought.

For example, the autonomous man abstraction has difficulty accounting for our obligations to others and loses foundational aspects of being human (e.g., the complete dependence of infancy).

Code then presents the separate works of Annette Baier and Caroline Whitbeck on “second personhood” and her own “ecological thinking” as parts of an alternative view. Rather than starting with the single, individual human, this alternative view starts with communality and interdependence. This relational alternative to the autonomous man instead sees that humans are members of communities, have collective histories, are in constant states of (re/un)learning, and have interests that are tied to the interests of others. Code’s own ecological thinking approach stresses that the choices organisms make are constituted by their external environment, which includes everything from the physical to the social, the historical to the instantaneous. Code also presents communality on a societal scale by pushing for continuity between the (seemingly dichotomous) public and private aspects of human life. This work on second persons demonstrates the basic critique that humans are *meaningfully connected organisms*, and that this feature must be accounted for in the research used to understand human life.

Feminist scholars would continue to forward this critique across social and political philosophy and moral philosophy, especially regarding questions of autonomy, justice, equality, rights, and ethical theory. Jennifer Nedelsky’s (1989) work “Reconceiving Autonomy: Sources, Thoughts and Possibilities” seeks to redefine, rather than throw away, autonomy for feminist theory. She develops this within the context of American law.

Nedelsky starts from feminist relational assumptions to present a notion of autonomy that can account for women's experiences, while also offering language through which feminists can talk about freedom and oppression. Nedelsky ultimately presents the dangers of the current framing of autonomy in the American legal tradition. She then calls for a legal sense of autonomy that recognizes the importance of social and political relations for human identity, understands the trade-offs between individual and community interests, and captures the particular feeling of autonomy.

Feminist relational theory was also used in discussions associated with feminist care theory. Jean Keller argued in 1997 for a relational account of autonomy that is drawn from a care ethical account of moral agency. And in 1998, Christine Koggel argued that the relational insights offered by care ethics are not in full opposition of justice approaches. Both scholars center care ethics, the non-ideal ethical approach that develops moral theory from human care practices, as a foundation. Keller's work is a response to the concern that the foundational idea of autonomy is at odds with the relational nature of care ethics. In her re-thinking of autonomy, Keller re-orientes what a "moral agent" is by recognizing that all people are embedded in relationships with others. She also stresses that autonomy can be understood as *a* human good, not *the* human good, which she uses to make room for the importance of human sociality. From this, Keller reconceives autonomy to account for social conditions, rather than to exist in spite of social conditions. Keller offers a dialogical view in which people "facilitate the development of autonomy competency" in others (1997, p. 161).

In a similar vein, Koggel resists the idea that care and justice are in opposition; she does this by probing the how the relational view of persons influences how we understand equality. Koggel outlines first that the language of equality itself is relational because it requires measuring treatment against some other thing. Koggel then argues that we can and should maintain the concept of equality in ethical and political discussions, but also to re-think the concept to include the fundamental nature of human relationships. For Koggel, feminist relational theory allows equality to be used to analyze society in support of anti-oppressive movements and scholarship.

Samantha Brennan's survey "Recent Work in Feminist Ethics" (1999) further outlines the early stages of feminist relational theory within moral philosophy. Brennan outlines the influence of the relational turn of feminist ethics as applied to family law (via e.g., Minow, 1990), contractarianism (via e.g., Hampton, 1993; Jaggar, 1993; Okin, 1989), views of responsibility (via e.g., Card, 1996; Walker, 1998), and abortion (via e.g., Gilligan, 1982; Sherwin, 1992). Brennan's main focus, however, is on the use of relational theory by feminist scholars to critique rights-based moral theory. In addition to contrasting the relational self with the atomistic self, Brennan differentiates the relational self from the embedded self. Where Brennan ties the relational self to feminist philosophers, the embedded self originates with communitarian philosophers. The embedded self refers to a view of the person in which the history and traditions of one's community defines their identity. The relational self differs because it sees histories and relationships as important parts of one's identity, but also recognizes that people can choose how they influence their identity; this

makes room for one's own interests and life choices in constituting their identity. Brennan describes the difference between the two views as a difference of degree (1999, p. 870). It is not in my purview here to take up these two meanings of self and how they fit within relational theory (i.e., to answer the question: Might the embedded self be a type of relational view?). However, it is important to see that Brennan's view of the relational self as described in feminist ethics makes room for both connection and separation. In all, relational thinking became important for feminist scholars who sought to understand both who and what a human might be, and how and why humans act in the way they do, or ought to do.

It is also important to note that there has not been, and does not continue to be, entirely clear agreement on all parts of feminist relational theory. For example, some scholars focus on mother-child relationships as central to developing relational theory (e.g., (Ruddick, 1980); Whitbeck's [1983] endorsement of Ruddick), but Code is hesitant to see it as paradigmatic (1987, p. 365). This does not, however, bar us from viewing feminist relational theory as a valuable tool. Nor does it, I think, bar us from following feminist relational theory as way to identifying the foundations of a broader relational theory. That people disagree and take relational theory up in different ways suggests that it is robust, fruitful, and mature. A soldering iron can be used to make both stained glass and electronics.

1.1.2 Basic relational theory now

To better understand relational theory as an analytical tool it is helpful to outline the essential parts of a broader relational theory, or a relational theory that is not necessarily

feminist. This might seem absurd because a relational theory is in some ways feminist by its very origins. It is largely feminist scholars who have pushed for re-orienting theory to account for relationships, and relationality is an important background assumption made by feminists. What I really mean by outlining a basic relational theory is to distinguish the relational aspects from non-relational aspects of feminist relational theory. This way, a basic relational theory offers a more flexible foundation for applying it to the philosophy of science.

It will be useful to start with the features of feminist relational theory. Koggel *et al.* (2022) outline eight key features of contemporary feminist relational theory: 1) it is committed to anti-oppression; 2) it considers interpersonal, network, and structural aspects of relationships, especially those involved in care practices; 3) it explores how the *status quo* influences our views of individuals and their capabilities; 4) it is interdisciplinary and open to empirical investigation; 5) it aims, centrally, to transform harmful structures and norms; 6) it is non-ideal; 7) it informs how we think about knowledge; and 8) it is pluralistic. Koggel *et al.* note that this list is not comprehensive, but that these eight features help to “differentiate feminist relational theory from other theoretical approaches,” (2022, p. 4). I take this list to demonstrate the unique intellectual environment in which feminist relational theory exists; it seems to me to be a feminist intellectual ecosystem of sorts, in which anti-oppression, conceptions of gender, liberation, cross-disciplinarity, and theoretical flexibility come together. So, how might we define a basal relational theory?

Central to all of this is that relationships are used “as the focal point for description and the unit of analyses,” (Koggel et al., 2022, p. 1). This forms the main foundation of a basic relational theory that applies outside of the feminist ecosystem. This notion is seen earlier in Koggel’s (2012) work on a relational view of equality (p. 70). In the context of feminist bioethics, Susan Sherwin and Katie Stockdale (2017) continue to support this in their use of relational theory as an “umbrella term” for “any approach to ethical questions explicitly attentive to the relational nature of selves,” (p. 9). Though rather simple, this focus on the importance of human relationships encompasses many sorts of relationships: intimate, systemic, political, relationships of relationships, and more. This breadth addresses an early critique of relationality put forth by Lynn Morgan (1996). Namely, that some forms of relationality discussed in maternal-fetal relationships replicate the individualism they try to avoid. Morgan calls for a more dynamic, reactive, dialogic view of personhood. Though a broad, umbrella view of relational theory does not directly address Morgan’s concern, it does allow for disagreement and pluralism on the specifics of what a relational approach looks like in certain contexts.

Relational theory has grown significantly in the last 20 years and the contexts in which relational theory is currently applied and developing are broad. Moral and political philosophy continue to benefit from relational theory, including in understanding responsibility in public health (e.g., Sherwin & Stockdale, 2017), applications of care ethics to health care (e.g., Maeckelberghe, 2004), vulnerability and dependency in global systems (e.g., Gagnon-Bouchard & Ranger, 2020; Gilson, 2015; Koggel, 2012), questions of consent

and autonomy in bioethics (e.g., Bell, 2020; as anticipated by Marway & Widdows, 2015), and justice in health crisis responses (e.g., Gilson, 2021).

New sorts of relationships and relationality are also being explored. Julia Watts Belser (2016) takes up human-material relations through disability scholarship. And, as part of his cross-disciplinary analysis of machine learning, Troy Richardson (2023) creates a dialogue between Indigenous relational philosophy and feminist relational theory. In this, he develops relational theory in the context of the technological turn toward machine learning. There have been additional applications of relational theory to the internal experiences of individuals. For example, Rebecca Coleman (2008) advances a connection between relationality, intuition, and the body; Ian James (2021) attempts to understand affects (even emotions) through the biological relevance of relationships; J. Lenore Wright (2018) seeks to understand the experience of miscarriage through relational aspects of pregnancy and parenthood; and Gregory McElwain (2020) identifies the role relationality played in much of Mary Midgley's scholarship.

It is yet unclear to me if relational theory ought to refer to relationships that do not directly involve humans. Is work on the relationship between two models or ideas or theories relational? Boholm and Corvellec (2010) outline an abstract theory of risk that is constituted by a relationship between what they call a "risk object" and "object at risk". This approach is, some sense, relational, but I would not include it in relational theory as I have developed it here. This is largely because the historical foundations of relational theory in Western philosophy are to do with the relationality of humans, and the tool has been developed to

answer who, what, why, and how questions about humanity. In Boholm and Corvellec's theory of risk, there can be cases where a risk relationship exists between concepts (e.g., a political ideology puts a type of literature at risk) and cases where a risk relationship exists between a human and some other (e.g., a political ideology puts a group of people at risk). The former seems to be relational only in that it strictly connects two things, while the latter is relational in that the experience of risk comes from the situatedness of human life. Further development on this question would be fruitful, but is not within the focus of the project at hand.

1.1.3 Relationality and non-human animals

The works explored thus far demonstrate the broadness of how relational theory is being applied within philosophy. From here, however, I will focus more specifically on how relational theory has been taken up with respect to practices that involve and our understanding of non-human animals. There has been a considerable amount of work that applies relational concepts to non-human animals. Some scholars' relational approaches have to do with human relationships with non-human animals, while others take up relationality in terms of the relationships certain non-human animals make themselves. I will look at samples of each kind of work across different fields of philosophical research. There are, of course, a fair number of disciplinary crossing-overs that occur in the application of relational theory to non-human animals. Common to each of these works is that, explicitly or implicitly, they take relationships and relational networks involving non-human animals seriously.

A significant amount of the work that applies relationality and relational theory to questions that involve non-human animals has come from moral philosophy. This makes sense; it is tricky to navigate the connection we have to other organisms, not just the connections each of us have to one another. Humans have also done, and continue to do, a lot of concerning things toward living beings. That these questions are important is reflected in collections of research dedicated to considering the morality of human-non-human relationships. *Animal Pragmatism: Rethinking Human-Nonhuman Relationships* (McKenna & Light, 2004), *Animal Ethics in the Age of Humans: Blurring Boundaries in Human-Animal Relationships* (Bovenkerk & Keulartz, 2016), and *Pets and People: The Ethics of Companion Animals* (Overall, 2017) are three volumes that take up questions about how humans do and ought to treat other animals, whether they are companions, “wild”, or domesticated for agriculture.

Pets and People: The Ethics of Companion Animals (Overall, 2017) features multiple different applications of relationality. Jean Harvey (2017) examines ethical questions to do with companion animals and develops an account in which the primary moral obligation humans have toward companion animals is a loving friendship. Cynthia Townley (2017) argues that relationships between humans and companion animals meet some philosophical accounts of friendship. Maurice Hamington (2017) also considers the moral relevance of human-companion-animal relationships, using the relationship to understand care and responsiveness. And, still in that same volume, Kathryn J. Norlock seeks to clarify the implications of human decisions within a network of dependency relations, specifically

regarding the networks of care required to support companion animals. Each work uses the relationships in which humans are embedded to target a different aspect of the ethics surrounding companion animals.

Applications of relational theory to human-non-human animal relationships have helped some philosophers shift how we think about relationality itself. Mary Midgley is one early influence on this topic. Much of her work probed how Western philosophy understood non-human animals, and how that understanding influenced ethical views of non-human animals. In “Are You an Animal?” (1989), Midgley questions what is meant by the different uses of “animal” in (primarily) Western society. One implication of this question is to reconsider how animals are popularly construed, especially in contrast/similarity to humans. Significant further shifts around how we think of human-non-human animal relationships themselves include Silke Schicktanz’s (2006) consideration of three model relationships for understanding these relationships: patronage, friendship, and partnership. In addition, Maneesha Deckha (2012) used the legal treatment of non-human animals in medical research to push basic relational theory past the “humanist paradigm.” And a recent editorial by Pelé *et al.* (2021) demonstrated that relationality between humans and other animals must include the situatedness of one’s environments (e.g., humans characterize animals based on their “role” in human society, like “domesticated” versus “wild” animals). Work continues to be done to shift the conceptual connections/separations between humans and non-human animals, and to advance how relational theory can include those connections.

Relational theory has also been used extensively to help scholars understand non-human animals. This work largely questions the foundational assumptions humans make about other animals. Fitzpatrick and Andrews' (2022) article on culture in captive animals examines whether non-human animals can have their own unique networks of relationships (i.e., relational structures). And human-non-human relatedness has also been useful in understanding whether non-human animals can exhibit cultural practices similar to humans (e.g., Meynell & Lopez's, 2021 work on gender). There has, additionally, been continued development regarding how non-humans are understood as moral beings. Some scholars argue that non-human animals exhibit what is considered moral behaviour on some ethical views (e.g., Wrage, 2022 via care ethics).

Finally, the bulk of work applying relational theory to non-human animals has to do with understanding the relationship between humans and other animals. In "What do Animals Want?" (2019), Becca Franks stresses that identifying the wants of a non-human animal is not done in a vacuum; humans have multiple modes of influence on the wants of non-human animals, and that must be accounted for in questions of animal welfare. Studies by Sorge (2008) and Eckardt Erlanger & Tsytsarev (2012) sought to understand how human characteristics, preferences, and behaviours both impact and are impacted by the relationship with non-human animals. Work on the ethical dimensions of the human-non-human animal relationship has examined these relationships in the context of meat harvest and agriculture (e.g., Cooke, 2021; Heidemann et al., 2020); as informed by different approaches to moral concepts (e.g., Humbert, 2022 on supplementing Deweyan ethics with care ethics and

ecofeminism; Palmer, 2001 on applying Foucault's ideas of power); and regarding what non-human animals might be owed by virtue of human relationality to them (e.g., Cohen, 2008).

In all, relational theory has been applied to many kinds of questions about non-human animals. Code concludes her 1987 paper, in part, by saying: "It is too early to say what implications such a shift [i.e., toward the second person view of humans] might have in terms of its effects upon epistemology, philosophy of science and, perhaps, scientific practice itself," (1987, p. 381). Thirty-six years later, I hope to test the effects such a shift might have on all three – epistemology, philosophy of science, and scientific practice – in the context of zoological research. I take that up now and will start by introducing relevant perspectives from feminist philosophy of biology before concluding with applications of relational theory to biology.

1.2 Feminist philosophy of biology

New applications of relational theory – including this project – enter into a rich, recent, and quickly developing scholarly space. I aim to add to this by applying relational theory as a tool within the philosophy of biology. To do this, I first must outline relevant shifts in the philosophy of biology, especially as they pertain to feminist critiques and practices within biology.

Feminist approaches to science refer to bodies of work within the philosophy of science, science studies, and scientific practice itself that are attentive to the influences gender and gender inequity have on the creation of scientific knowledge. The feminist

approach starts with the basic idea that science is a gendered activity. Hilary Rose's (1983) article, "Hand, Brain, and Heart: A Feminist Epistemology for the Natural Sciences" asserts that, far from being sexless, science is a male-centric activity. This is not to say that scientific practice is only practiced by men or concerned with the activities of men (though it often is). Rather, this means that Western scientific practice features the same patriarchal ideologies and power structures that oppress women² within Western society. On Rose's account, studies of Western scientific practice have been largely concerned with *production* of knowledge and things, leaving out other important elements of the scientific process, like individual choice, economic pressures, and social pressures. Rose calls for a shift toward a feminist science, or a science which recognizes the "hand, brain, *and* heart" (1983, p. 90, emphasis in original). Evelyn Fox Keller (1983) identifies the same in her analysis of the connection between gender and science. In this, Keller is especially concerned with the development and influence of the erroneous view of science and objectivity as "masculine". She offers insight into how such assumptions influence views of both science and gender.

As part of this, feminist approaches to science recognize that the identity of those creating knowledge – knowers, scientists – are relevant parts of the scientific process; this constitutes a major epistemic turn within feminist philosophy of science. Wylie *et al.*'s (1989) review of feminist critiques of science supports that feminist philosophy of science emerged as a "response to particular examples of androcentric practice," (p. 379). They

² There is further important work to be done to move past gender binaries and see if such analyses apply in similar ways to an extended view.

further add in that the influence of sexist ideologies excludes and devalues women as knowers. In “After Absolute Neutrality,” Sandra Harding (2001) explores different examples of scientific practice that are aware of the situatedness of knowledge creation in the sciences. Harding demonstrates that scientific knowledge creation need not be culture-free or neutral.

These basic features of feminist science also mean that it is deeply tied to feminist politics. Helen Longino (1987) develops on the idea of feminist science by asking if, theoretically, a feminist natural science is possible. In answering this question, Longino highlights that feminist values and political commitments are important to feminist science. This is largely because a feminist science requires a commitment to shifting sexist attitudes. In this way, feminist science is importantly different from a feminine science. Longino concludes that feminist science is possible in principle, but to be done in practice requires a shift in the social and political conditions in which science is done. Though Longino came to this conclusion in 1987, it is still very much the case in 2023. Feminist philosophy of science seeks to make that shift.

Finally, Deboleena Roy’s (2004) analysis of her own shift toward feminist scientific practice as a reproductive neuroendocrinologist demonstrates that feminist science is also focused on experience. Roy specifically attempts to re-cast the Scientific Method in terms of a process of feminist inquiry proposed by Harding (1987) and developed by Spanier (1995). In this, Roy stresses that scientific activities are dynamic, informed by practice, and influenced by the limitations people experience. Feminist approaches to science pay attention to the influence of sexism, science as a practice, subjective aspects of scientific practice, and

the real-world, non-ideal experiences involved in scientific work (including the influence of economics and politics). Feminist philosophy of science sees that the laboratory is not only full of sterile workbenches and computers, it also contains people, and their identities and personal commitments matter.

Feminist philosophy of biology fits into the feminist philosophy of science program but includes some discipline-specific applications. As with other feminist philosophers of science, feminist philosophers of biology pay attention to “sex, women, and gender” (Fehr, 2008b, p. 570) in their research on biology. Feminist philosophers of biology are interested in how feminist theory and biology influence one another.

One way they do this is by analyzing how biological concepts are applied outside of the discipline. Because biological concepts have been used extensively to support sexist oppression, much of the work in feminist philosophy of biology has sought to uncover, critique, and correct just how such concepts have served sexist ideologies (Nelson, 2017). Such work has targeted erroneous uses of evolutionary theory (Ruse, 1984), molecular genetics, and cytology (Richardson, 2019). In these contexts, feminist theory helps to interrogate how biological arguments are applied in biased ways. Such work demonstrates how biological concepts are used to “construct and enforce dominant human conceptions of sex differences and gender norms” (Richardson, 2010, p. 348). This means that feminist philosophy of biology support feminist endeavours by offering clear theoretical and empirical tools for addressing sexist power structures (e.g., as discussed by Okruhlik, 1994;

Rose, 1983). In this approach, feminist philosophers of biology target biological concepts outside of the discipline of biology.

A second way feminist philosophers of biology connect feminist theory and biology is by using insights from feminist philosophy to produce robust and reliable scientific understandings of biological phenomena (e.g., especially regarding sex, women, and gender; Fehr, 2008, p. 571). Sarah Richardson's work *Sex Itself* (2019) demonstrates this beautifully. Richardson addresses claims that the "Y chromosome is the male chromosome" by examining both historical and current research on the molecular genetics of the human X and Y chromosomes. Richardson clarifies the influence chromosomes have on sex from molecular to macroscopic scales, providing a robust and current analysis of sex in humans. In this approach, the feminist philosopher of biology applies their analyses to biological research itself.

And third, feminist insights target the actual process of knowledge creation in biology (Fehr, 2008b). Much of this work seeks to identify how gender biases influence the methodologies used in biological research (Richardson, 2010) and the hidden assumptions or "cognitive traps" that gendered ideologies introduce to the knowledge-making process (Anderson, 1995). An important example of this includes the work done by Elisabeth Lloyd (1993) to demonstrate how sexist assumptions have shaped research on reproduction. Lloyd demonstrates that patriarchal social assumptions have influenced explanations of sexuality that frame female sexuality as purely reproductive. Lloyd calls for the recognition that pre-theoretical beliefs influence "*all* stages of scientific research" (1993, p. 150, emphasis in

original). This type of activity within feminist philosophy of biology ties closely with feminist and social epistemology.

1.3 What does relational theory look like in biology?

The theoretical and practical ties between feminist theory and philosophy of science mean that there is space for applying tools from feminist theory to the philosophy of biology. In this final section, I examine works from the philosophy of biology and biology that apply relational theory and relationality to human-non-human animal relationships. As a reminder, using relational theory as an analytical tool involves paying attention to relationships and seeing relationships as valuable units of analysis. What this means in the context of the philosophy of biology is that relationships become a useful analytical frame that scholars use to understand biological theory, the extra-disciplinary influence of biological theory, and the processes by which knowledge is created in biology. Within biology, I further focus on relationships that involve human and non-human animals.

1.3.1 Relational theory in studies of biology

Some works on the theory of biology have applied concepts from relational theory as a way of understanding the abstract relationships that exist between different organisms. In his contribution to *Redefining Nature: Ecology, Culture and Domestication* (1996), David Harris attempts to clarify the sort of relationship that exists when humans domesticate other species. Though the editors self-identify this book as part of the anthropology of human-nature relationships, Harris draws on philosophical concepts in his attempt to understand

theoretical dimensions of human-non-human organism relationships. Harris targets domestication broadly, using connections between humans and domesticated plants and humans and domesticated non-human animals to clarify what domestication involves. As part of this, he introduces the wild-domestic dichotomy that is used to categorize types of human-other-organism relationships. Harris examines how that dichotomy focuses attention on only some ways humans manipulate their environments. He then outlines how humans manipulate their relationships with non-human animals through predation, protection, and domestication. Here, Harris draws attention to the many sorts of relationships humans cultivate when consuming other organisms.

Gross and Averill's (1983) article in *Discovering Reality* seeks to understand how relationships are framed in evolutionary biology. The authors specifically offer a feminist critique of competition by questioning how scarcity logic and competitive relationships are used to frame human understanding of biological systems and evolution. Though they do not explicitly appeal to relational theory, their attention to and attempts to reframe the relationship between organisms connects strongly to the main focus of relational theory (i.e., dynamic relationships as units of analysis). Gross and Averill analyze the importance given to competition as a selective force and attempt to clarify how patriarchal ideologies might skew research about evolutionary theory. They propose plenitude (rather than scarcity) and cooperation (rather than competition) as alternative concepts through which evolution may be studied.

Other uses of relational theory in the philosophy of biology include highly applied attention to the relationships that exist and are possible between humans and non-human animals. Lauriane Mouysset (2023) analyzes human-nature relationships and what those relationships look like in three environmental sciences (i.e., conservation biology, sustainability science, and sustainability economics). They compare their chosen environmental sciences via a framework developed by Georgina Mace (2014). Mace describes four views of nature used by environmental scientists: 1) nature itself, 2) nature despite humans, 3) nature in service to society, and 4) nature and society. Mouysset sees each view as describing a different relationship between humans and the non-human aspects of their environment. They then analyze how different human-nature relationships influence scientific approaches and responses to ecological crises, namely through policy creation. Mouysset uses Mace's framework to first understand how conservation biology, sustainability science, and sustainability economics view the relationship between humans and nature, especially regarding ontological differences between humans and the environment. Mouysset also uses human-nature relationships to outline how recommendations offered by each environmental science work together. On Mouysset's view, recommendations developed by environmental scientists risk producing conflicting policies. Such conflicts can result from what they call multiple "prescriptive value-laden" approaches, which result from different views of human-nature relationships.

Another applied use of the relationships between humans and non-human aspects of the world comes from Mirko Cerrone (2020). In "Interspecies Relationships and Their

Influence on Animal Handling: A Case Study in the Tallinn Zoological Gardens”, Cerrone aims to understand how captive animals and their relationships with handlers might influence handling practices within zoos. Through a small (n=3) qualitative study of zoo handlers, Cerrone identifies that interactions which allow a handler to relate to the individuals they handle can help the handler tailor how they perform their duties. Cerrone also proposes that similarities in Umwelt (i.e., the “life-world” or the world experienced by an organism) between human handlers and a captive non-human animal might support a handler in creating a meaningful relationship with an individual captive animal. Cerrone focuses on how human decisions are influenced by the human-other relationship but recommends that further work analyze how the non-human animal exercises their own decision-making in handling contexts.

The work of Lynda Birke has been a consistently important part of the philosophical analyses of human-non-human animal relationships. Birke’s scholarship on human-non-human animal relationships has largely focused on the intersection between feminism – including the broader women’s studies and more specific feminist studies of science – and the use of animals in science. Birke’s book *Feminism, Animals and Science: The Naming of the Shrew* (1994) offers a deep look at some ways human relationships with other animals helps us learn about feminist science. She starts by outlining different meanings of “animal” in Western society and science, then analyzes the use of laboratory animals, and finally seeks to uncover assumptions about “animality” and the human/animal divide that have been used

in feminist analyses of biology. Across each part of the book, Birke is interested in how people talk and write about – a sort of “naming” of – animals in scientific contexts.

Birke focuses on how perceived differences between humans and other animals guides how humans think about our relationships with animals. She draws this strategy from feminist thinking more broadly, in which theorists focus on how the perceived differences of women influence how they are treated. Just as many feminist scholars have analyzed the social construction of gender, Birke is interested in analyzing the social construction of “the animal” in Western science. She is also interested in how “scientific approaches” are socially constructed. Namely, Birke identifies that traditionally feminine feelings of care toward an animal subject in the laboratory must be unlearned to be a “real scientist” who performs uninterested, objective science.³ One of her central conclusions is that the social relationships between humans and non-human animals in the laboratory are mediated by labour roles (e.g., scientists versus care technicians) and gender roles (e.g., technicians are more frequently women). The contextual nature of these social relationships in turn shapes how animals are framed in science. Conceptually, “the animal” may be made to be an object and is often placed at the bottom of a power hierarchy, far below the scientist who uses the animal.

In relatively more recent works, Birke has continued to use human-non-human animal relationships as a tool for analyzing how humans construct meanings of “the animal”. In

³ Another dimension of this discussion is that de-sensitivity is sometimes a necessary emotional adjustment for those working in fields that require regular euthanasia of study subjects. This is an interesting and valuable avenue for analysis but strays far from the scope of the project at hand. Birke (1994) offers a brief treatment of this in terms of the work of animal technicians in research laboratories.

“Intimate Familiarities? Feminism and Human-Animal Studies” (2002) Birke is again interested in crossing over academic feminism and studies of human-non-human animal relationships. She is concerned both with how academic feminism neglects non-human animals and how animal research neglects gender. This short article lays out ways that animal research might benefit from considering gender, like in seeing gender as a construct or as something that influences how animals participate in relationships. Birke also calls for feminist theory to resist construing non-human animals as a sort of “other” and to explore situatedness as a feature of non-human lives.

And, with Mette Bryld and Nina Lykke in “Animal Performances: An Exploration of Intersections between Feminist Science Studies and Studies of Human/Animal Relationships” (2004), Birke more deeply analyzes how human-non-human animal relationships influence the behaviour of those in the relationship. In this paper, Birke *et al.* are interested in using performativity (i.e., the practice, production, and growth of certain behaviours in social contexts) to challenge the human/animal divide. The authors are interested in analyzing the human-non-human animal dyad (e.g., human handler and training dog) as a single unit. They use this single unit to argue that the way humans create meaning about the identity of other animals is automatically influenced by the relationship between the two. This article asks for humans to consider how they are influenced by the animals with which they work or, more simply, the animals that they consider. Overall, Birke’s scholarship attends strongly to the relationship between humans and other animals to uncover how humans think about “the animal” and to strengthen feminist critiques of science.

1.3.2 Other sorts of relationships in the literature

It is also important to notice other notions of relationality that have been used in the philosophical and biological literature, but do not apply in the same way relational theory might. Research in evolutionary theory relies heavily on different sorts of relationships. These relationships are often large-scale (i.e., in time, space, geography) and abstract. Research areas include: homology, or similarities in body structure between different taxa due to evolutionary relatedness (e.g., similarities in forelimb structure); relatedness between taxa, often using phylogenetics (i.e., studies of relatedness using heritable traits) and taxonomy (i.e., classification of organisms more generally); and co-evolution, or the joint evolutionary development of two or more species. Research in ecology also has to do, by definition, with relationships. Relationships within and between organisms, populations, communities, ecosystems, and more are often the focus of description and prediction in ecology.

Robert Rosen (1958) describes what he calls “A Relational Theory of Biological Systems” for thinking about metabolism. He uses this paper to outline a generalized, abstract model (or framework) of metabolism that is shared across biological organisms. Rosen uses relationality in a thin sense to refer to how metabolic operations connect, interrelate, and influence one another. His central interest is to describe the feedbacks and dependencies required for a metabolic system to run smoothly. Overton & Lerner (2014) also offer a relational approach to developmental science, using a sort of paradigm they call “Relationism”. This approach shares some features with relational theory in that it has been

developed with processes, pluralism, context, and a resistance to dichotomies in mind. The authors are interested in questioning the theoretical approaches that have typically been used to frame development. The authors' relational view of development, however, is focused on the connections within and between abstract biological systems that allow living organisms to develop and self-regulate. This means that the version of relational theory used by Overton and Lerner is focused on relationships between systems within individual bodies (i.e., through chemical feedbacks and regulation). They *do* see developmental systems as interrelated, but do not expand to discuss how broader environmental contexts influence those interrelations. In this way, Overton & Lerner develop a meta-system view of development but are not really interested in relationships between organisms; their interest is within the organism.

Many of these concepts and works concern connections – relationships – between two or more “somethings”. So then might these sorts of research be thought of as relational and as applications of relational theory? Relational theory as borne out of feminist theory pays attention to relationships as involving humans. Relational theory is aware of the role humans play in constructing, mediating, participating, and receiving relationships. As previously stated, there may be room for relational theory to take on theoretical and abstract relationships, but the scope of this project means I will not develop that extension of the theory. I am, however, hesitant to say that relational theory can apply to relationships that are *so* abstracted or idealized they have lost the situatedness and reflexivity of feminist theory. For this reason, relational theory might not be the most appropriate tool for understanding

metabolic cascades, abstract developmental systems, the phenomenon of homology, or community structure. This is not to say this research does not take up important relationships and connections; indeed, this research is very important to the scientific enterprise.

1.3.3 Sizing up a gap

Thus far, some theoretical analyses of human and non-human animal relationships have used relational theory as an analytical tool. A large number of these works concern the ethical dimensions, questions of power and justice, and political aspects of relationships between human and non-human animals. This makes sense. The origins of relational theory in social and political philosophy mean that, as a tool, it is well suited to social and political questions. Scholars who pay attention to the relationship between humans and other animals pay close attention to human dimensions of the relationship in such contexts: How are humans treating others? What do humans owe others? How might human constructs (e.g., society, the judicial system) influence other animals? These are only a few of the questions that are being explored.

Concepts from relational theory have also been applied to aspects of human-non-human animal relationships that are relevant to biological research. Such works have primarily used relational theory to understand, clarify, and redefine how humans conceptualize “the animal” and the human-non-human animal relationship itself. Other works have used relationships and feminist contexts to question biological theory (e.g., clarifying competition or domestication). However, there have been few investigations into

the influence relationships between humans and non-human animals may have on the creation of knowledge in biology. I propose to change how we think about the relational nature of zoology as a way of investigating epistemic processes. I aim to pay attention to the ways the relationship between zoologist and study subject *itself* influences knowledge creation.

Birke's work offers a precursor to research on the epistemic influence of human-non-human animal relationships in a biological research program. Though she mostly focuses on how our understanding human-non-human animal relationships might influence the treatment and welfare of non-human animals, Birke's interest in how such relationships *influence science* is most relevant to the project at hand. She is attentive to the role of the researcher in research:

I found it peculiar that the love of nature that, in part, drove me to want to study biology seemed to be at odds with the scientific methods in which I was trained. Loving nature meant a respect for its complexity, yet to do science means to accept its reductionism. ... Doing science often meant awe at the wonderful ways that such 'systems' worked; nature was, indeed, very clever. But it also seemed to mean denying the awe at the marvellous creatures that exist in the world, in all their complexity and individuality. (1994, p. 7)

Birke is interested in the ways that accepted scientific norms regarding animal research is discontinuous with the different values held by scientific researchers. This concern is mirrored in the work of Mouysset (2023) – who describes how different sorts of relationships influence the shape of scientific approaches – and Cerrone (2020) – who recognizes that the ways humans understand their relationships with other animals shape how humans act toward other animals. Mouysset (2023), however focuses on human-nature relationships broadly, and Cerrone (2020) focuses on the applied outcomes of the human-non-human animal relationship.

From here, I hold that relational theory offers a potentially potent analytical tool for investigating how knowledge is produced in zoology. I have isolated four accounts and one critique that help this tool take shape. Sherwin and Stockdale’s (2017) umbrella view of relational theory forms a broad foundation which I use to establish my analytical target as relationships themselves. Code’s (1987) “second person” account of relationality will allow me to see individuals as centrally communal, and to see how the interests of multiple individuals can be linked and co-constituted. Keller’s (1997) “moral agent” account of relational theory lets me use relationships to frame different individuals – including non-humans – as capable moral agents. I will also use Nedelsky’s (1989) view of people as embedded in social and political relationships to remind us of the social dimension of knowledge creation in zoology. Finally, Morgan’s (1996) individuality critique of relational approaches will prove useful in fleshing out my extension of relational theory in zoology.

Relational theory and feminist philosophy of biology are compatible. Relational theory pays attention to the role and influence of relationships. Feminist philosophy of biology is concerned with how particularities, contexts, and power influence biological research and *vice versa*. Because relationships between human and non-human animals are foundational to research in zoology (i.e., the creation of human knowledge about non-human animals) it seems important, and an intuitive next step, to clarify how the relationship itself might shape the knowledge created by zoologists about other animals.

Chapter 2:

Mapping the Scientist-Subject Research Relationship

There is a familiar origin story in science where, as a child, Scientist X becomes fascinated by and curious about certain things in the world, which encourages them to learn and question as much as they can about their fascinations until, finally, they can pursue said interests “for real” in adulthood. Humans are inquisitive, fascinated, and interested in their own particular projects or ideas. Beyond that, these fascinations can drive a scientist to care deeply about their subject of inquiry. Recent feminist and social turns in philosophy of science have highlighted that the identities of knowers – the unique interests and experiences of a person who knows or seeks to know something – are relevant and influential parts of the knowledge-creation process (e.g., Anderson, 1995; Code, 1981; Harding, 1991; Longino, 1987). Scientists are knowers, and the unique interests and experiences of a scientist are relevant and influential parts of knowledge creation in science.

Science is a social endeavour, requiring the contributions of many different sorts of people to handle many different sorts of questions we – humans – have about the world. Differences in how scientists approach, participate in, and perform scientific processes in their research has been a source of interest for feminist and social philosophers of science. My aim in this overall project is to understand the potential epistemological implications of relationality in zoology. To support this, I aim in this chapter to develop a clear view of one sort of relationality involved in the zoological research process. I focus on the relationality that comes from the connections between zoologists and the creatures they study.

In this chapter, I argue that we – those interested in how zoology functions as a scientific discipline, namely philosophers of biology, feminist philosophers, and perhaps zoologists – can differentiate research approaches used by zoologists using relational theory. I began this discussion in Chapter 1 by offering relationality as a useful axis for analysis. In this chapter, I develop what I call the “state of interest” held by a researcher in their research, and I specifically outline research approaches that differ on a researcher’s *state of interest toward relationality*. I hold that zoologists have differing views of the connections they have to their study subjects. And, more importantly, I hold that such differences meaningfully influence the way zoologists structure their scientific research. I do this by applying core views from relational theory to describe and differentiate research approaches taken up by zoologists in their scientific practice.

I start in section 2.1 by demonstrating that relationality – the feature of having relationships – between researchers and study subjects is fundamental to zoological research. In this section I aim to clarify how zoology works, generally, as a scientific activity. I use this characterization to locate the foundational research relationship between zoologists and their subjects. I use Sherwin and Stockdale’s umbrella view of relational theory as a guide here. In this, I define the “zoological research relationship”.

In section 2.2, I introduce the scientific work of Jane Goodall as a case study for identifying whether and how the research relationship might be significant in zoology. In addition to identifying the basic relationship between zoologist and subject, I introduce what I call a researcher’s “state of interest” as it applies to relationality. I present “state of interest”

as way of understanding the added intentions, meanings, and affects some zoologists take in their zoological research relationships. I clarify what sort of interest toward relationality might shape a researcher's view of this relationship. Code's "second person" account, Nedelsky's "social and political embeddedness" account, and Keller's "moral agent" account of relationality prove useful here. This begins my analysis of the ways added interest in the zoological research relationship can significantly influence zoological research processes.

In section 2.3, I build on this understanding of the zoological research relationship. I offer an account in which I use researcher "state of interest" as a way of isolating different sorts of research approaches in zoology. I develop this account in terms of relationality, meaning I am interested in understanding different states of interest researchers may have toward their relationships with their study subjects. I contrast "high" and "low" states of interest toward the zoological research relationship. I will start by introducing classic feminist critiques of traditional, value-free ideals of science. I then use a more recent view on values in science via Heather Douglas to situate a research approach with a "high state of interest toward relationality" within current philosophical views of science. I specifically seek to outline this relational research approach as one that incorporates affective values. Goodall's research program offers a helpful case study for working through this analysis.

In my final section, I introduce Eugenie Clark as a second case study to summarize the previous points and respond to potential objections. Clark's work on sharks helps to clarify how "high states of interest toward relationality" may apply to less or non-charismatic

animals. Through this work, I start to expand the edges of relational theory by attending to relationships in zoology, thereby shaping philosophical analyses of science.

2.1 Identifying the zoological research relationship

Zoology refers to the scientific study of non-human animals. Zoologists are interested in describing, for instance, how animals function, where animals are in the world, how they behave, and how they relate to one another. Questions of interest in zoology differ along multiple axes: size (e.g., from zooplankton to blue whales), time scales (e.g., from what is happening today to evolutionary timescales), levels of abstraction (e.g., individual animals compared to metapopulations, or abstract modelling compared to describing specific niches), the types of methodologies used (e.g., statistical modelling, laboratory experimentation, field manipulation), and more. Inquiry in zoology is broad but is united by the aim to answer questions about non-human animals using scientific methodologies and following scientific practice.

As a scientific discipline, zoology follows scientific processes to generate knowledge about the world. When describing zoology “as a scientific discipline”, I use a broad characterization of scientific research as an iterative process, in which a researcher: 1) poses a question or problem, 2) generates a hypothesis or some preliminary answer to that question or problem, 3) carefully tests or collects observations that help address some aspect of that question or problem, 4) analyzes their findings to infer conclusions, and 5) communicates their findings (Emden, 2021; Longino, 1987). Here, the intention is, in the words of Helen Longino, to frame science as “practice rather than content, as process rather than product”

(1987, p. 53). This characterization helps demonstrate the key practices that allow zoologists to create knowledge about animals.

As a biological discipline, the role of zoology is to help generate knowledge about living organisms in the world, namely animals. Though humans are included in this study by definition – humans are in the kingdom Metazoa – specific questions about human activities are often addressed by disciplines within the social sciences and humanities. But, just as with other biological disciplines, insights gained from research in zoology can help explain some of human life because humans are biological beings (i.e., living organisms). Creating knowledge about the specifics of non-human animal life is, however, the focus of zoological research.

In order to analyze the influence relationality has on the creation of knowledge in zoology, it is important that I start to give shape to the sort of relationality I focus on going forward. This is where I start to apply relational theory as a conceptual tool in this analysis. Sherwin and Stockdale's (2017) umbrella view of relational theory offers an especially useful tool for understanding the basic relational foundations at play in zoology. Recall from Chapter 1 that Sherwin and Stockdale hold a broad, rather simple view of relational theory that describes it as any sort of approach that is focused on the relational, embedded nature of individual selves. This means that to analyze zoology using relational theory, I need to be clear on what sort of relationship I am concerned about.

Relationships between researchers and study subjects are foundational to scientific activities within zoology. The creation of knowledge through scientific processes is a human endeavour (Longino, 1990), and zoology focuses this endeavour on non-human animals. This means that relationships between scientists (e.g., as born between colleagues, from mentorship, or competition) can – and do – have bearing on the epistemic activities in zoology. My focus in this work is not on the unique role of this sort of relationship⁴.

This also means that, since zoology is the scientific study of animals, zoological research is the study of animals *by* humans. All zoological research functions via a core connection between humans (zoologists conducting research) and other animals (the subjects of study). If we take relationships to refer to connections between two subjects, this practical connection forms a basic relationship between the researcher and study animal. I call this relationship between a researcher and a study subject in zoology the “zoological research relationship”; it is a research relationship created by and constituted by the research environment of zoology.

Given the foundational nature of the researcher-subject relationship, does it influence the way a researcher carries out scientific processes in their research, or is the relationship simply a happy artifact of the scientific process in zoology? It is toward this question that I move next.

⁴ In Chapter 3, I do, however, examine some ways this relationship may be influenced by the relationship between zoologist and study subject, which is the focus of the present work.

2.2 Case study: Jane Goodall and chimpanzees

2.2.1 Researcher state of interest toward relationality

To begin analyzing the potential role of the researcher-study-subject relationship in zoological research, I use a case study of Jane Goodall's work with chimpanzees to further clarify the shape of the researcher-subject relationship. I focus now on Goodall's work for three reasons. First, because Goodall's research program was focused on describing the basic ecology and behaviour of a specific group of chimpanzees, the research relationship between the Gombe field researchers and the chimpanzees is well-defined. Second, her findings on the behaviour of chimpanzees are widely recognized for shifting views of how ethology and primatology can be done in Western scientific academe (Botero, 2020). Goodall's research approach was recognized to be quite different from the status quo in primatology at the time because of her focus on individual animals, which suggests that there may indeed be something significant about the role the research relationship plays in research. The third reason is pragmatic: the structure and intent of Goodall's research program resulted in detailed accounts of methodologies that include the role of the researcher. Goodall's attention to both the subject and researcher in her research products will be useful for clarifying what role the researcher-subject relationship might play in zoological work.

Goodall started researching the life and behaviour of long-haired chimpanzees (*Pan troglodytes schweinfurthii*) in Gombe National Park (then a game reserve), Tanzania in 1960 (Goodall, 1986). Her field research involved a variety of methodologies, the best known of which was field observation. Observational research methods in biology refer to the

collection of empirical data through watching and following the actions of an organism or group of organisms, and can be laboratory- or field-based. Within the study of animal behaviour in primatology, this research method grew to focus on wild, free-living primates in the mid-twentieth century (Rees, 2007). In using these methods, scientists aim to understand the natural behaviour of non-human primates, collecting detailed observations of phenomena including specific behaviours across contexts, social structure, and individual life histories (Goodall, 1986; Rees, 2007). Though there has not been full consensus on the best way to structure observational methods, the general principle involves a scientist (observer) recording behaviours of a study subject or group of subjects (observed); there exists a relation between the scientist and subject. This observer-observed connection constitutes a form of the researcher-subject relationship discussed above.

There is something interesting in Goodall's approach, however, that goes beyond the thin, basic relationship between researcher (observer) and subject (observed). Goodall's observation methods follow the general observation principle but feature an added layer of interest on the part of the observer. I call this added layer a researcher's "state of interest toward relationality". I offer "state of interest" as a useful modifier because it allows us to see the researcher's own values as a modifier. In this view, "interest" means something like attention or focus. But toward what? It is likely that a researcher can have multiple states of interest toward different things. People are, after all, organisms with multiple values and multiple commitments. Many scientists have a sort of professional curiosity toward their subject. This is common to all approaches and is likely to be part of a researcher's overall

state of interest, perhaps as a “state of interest toward biological phenomena or scientific puzzles”. I am specifically interested in a type of interest that is focused on relationality: a researcher’s “state of interest toward the zoological research relationship”.

What would be involved in shaping a researcher’s state of interest toward their relationships with study subjects? Code’s (1987) “second person” view of relationality is useful here because it reminds us to think of humans as, foundationally, participants in vast social networks. Recall that, as part of this view, Code presents humans as meaningfully connected beings. Developing an account of the state of interest toward relationality, then, ought to recognize these meaningful connections. This adds an affective element to my account of interest in relationality. Humans create meaning by using their affective states (i.e., feeling states) to understand certain stimuli. My relationship with my dog is meaningful because I care for him and feel love for him, and he returns similar behaviours. I am highly interested, or attentive, to our relationship because I see it as a bond that is important.

I do, however, want to bring our attention back to the “meaningful” part of Code’s “second person” account. This is because meaning is not always created in the same way. I want to be clear that though positive affective states are often easier to see and are more motivating in professional research, negative affective states may also shape the meaningfulness of the zoological research connection. Affective states are notoriously tricky to isolate and keep tidy track of. For this reason, focusing on “meaningfulness of relationships” as central to the “state of interest toward the zoological research relationship” is important.

A high state of interest toward her relationships with study subjects can be demonstrated by Goodall's observational research methods, especially in her focus on building meaningful connections to chimpanzees. Getting to know her study subjects was important for Goodall. From the beginning, Goodall gave individual subjects names. Field observations were conducted, at first, by recording observations through binoculars from distances of 100 metres or more (Goodall, 1986). As the chimpanzees became habituated to the presence of humans, observation distances decreased and Goodall accepted and initiated social contact with some individuals. In July of 1963, Goodall established an artificial feeding area (Goodall, 1986). With the growth of the Gombe Stream field station, researchers made observations across multiple contexts, including at the artificial feeding area and on the landscape.

Across the chimpanzee research program, Goodall demonstrated attention toward the connections she could make with the chimpanzees she studied. Goodall was intentional in this as her research approach relied heavily on building a strong relationship between the observer and the chimpanzee being studied. Much of this was done with a focus on respectful interaction. In her description of her field methods, Goodall wrote: "[The observer] must appreciate and respect the animal being studied, in order that the all-important observer-subject relationship be built up and maintained," (1986, p. 603).

Goodall's focus on intentionally engaging with the chimpanzees on the chimpanzees' terms also demonstrates Keller's "moral agent" view of relationality. In understanding relationships, Keller calls for recognizing the capabilities of each member of a given

relationship. Each party not only participates in the relationship, but also has their own interests. In Goodall's case, the habituation process recognized that each chimpanzee was not easy to manipulate. Goodall's interest in developing and maintaining meaningful positive connections with the chimpanzees related strongly to seeing each organism as a capable being themselves. This in turn influenced the data Goodall could collect. For example, with increased tolerance of humans, individual chimpanzees could be studied via "long follows," or continuous watching over multiple days or weeks. Detailed records were kept across time, allowing for the creation and maintenance of a long-term dataset on the chimpanzees living in Gombe.

2.2.2 The individualism critique

It is important to notice that the account I am building here relies on what might be considered an individualistic view of relationships. Framing the research relationship as the connection between a researcher and a study subject risks focusing our attention on a type of relationality that only recognizes connections between two isolated individuals. This concern is similar to a concern posed by Lynn Morgan regarding some treatments of maternal-fetal relationality.

In "Fetal Relationality in Feminist Philosophy: An Anthropological Critique" (1996), Morgan constructively critiques the use of a relational view of personhood in framing fetal politics. Namely, her concern is that some relational accounts of fetal relationality (i.e., developing a view of the fetus in relation to the pregnant carrier) unintentionally replicate Western individualism. Morgan is concerned that locating the fetus in relation to the carrier

as a way of giving the carrier agency in their reproductive decisions risks placing *all* responsibility on the carrier. She is especially concerned that focusing attention on the pregnant person removes them from society, which may absolve “society of responsibility to foster social climates conducive to bearing (or not) and raising children,” (1996, p. 54). Morgan locates this issue in an assumption of corporeal autonomy, where relational personhood results from a connection between biologically independent beings. Morgan calls for a perspective on relationality that is more reflexive, dynamic, and recognizes how social contexts continue to shape personhood: “Personhood must be understood as an outcome of power relations, as an unstable project subject to constant negotiation and debate,” (1996, p. 63). For Morgan, it is important to see agency and decision-making as things that are socially negotiated and dependent on power dynamics of different contexts.

This concern raised by Morgan is important, and I think it is salient to look for a related concern in a relational account of zoological research. Does the research relationship as I have discussed here replicate Western individualistic assumptions? If I transfer parts of the argument made by Morgan, such a replication would appear as an over-simplified, static view of the research relationship and what it means in a social or political context. I am not concerned with the biological individualism described by Morgan; it seems clear in zoology that the researcher and study subject are independent and are not – on the scale of a scientific research program – co-created. What *is* important, however, is that understanding the research relationship must include the political and social contexts in which the relationship participates. We must also be attentive to the dynamic nature of the relationship.

This means two things in the context of this work. First, if we are to take the research relationship in zoology seriously, we must also be attentive to the potential political and social contexts that influence and are influenced by the interaction between a researcher and subject. Nedelsky's "social and political embeddedness" account of relationality becomes important here. Recall that Nedelsky (1989) understands individuals as participants within broader social and political circles. On Nedelsky's account, we can see individuals as both fundamentally connected and isolated, so long as we recognize that the individual experience is strongly shaped by political and social environments.

For example,⁵ Goodall's efforts to establish an artificial feeding area did not only influence data collection, but also induced artificial gatherings of different chimpanzee groups, which influenced social structures, feeding habits, and aggression (1986, p. 52). The artificial feeding area also influenced the relationship each chimpanzee had with the researchers because the chimpanzees relied on the humans to supply food. This shows that the decisions made by a researcher can shape the research relationship and the data being collected.

And, second, we must be attentive to the dynamic nature of relationships between living organisms. Both the researcher and the study subject experience and respond to stimuli, some of which comes from the other party in the relationship. This means that the

⁵ Thanks to Letitia Meynell for this counter example.

research relationship does not have a strict shape and must be approached as a responsive connection.

2.2.3 Constraints on the zoological research relationship

A second point to consider is whether research relationships in zoology are constrained to relationships between individuals or can extend to relationships between individuals and groups or even between groups. The sort of relationship represented in Goodall's research program was one between individuals. While Goodall observed individual chimpanzees within their own social contexts, the focus was still on the behaviours of individuals. Primary observations involved asking "What is Flo or David Greybeard doing?" rather than by asking "How is the F family group feeding at time t ?". This is an important practice in questions about animal behaviour, but focusing on the individual is not common to all zoological research. In some cases, a researcher may consider their study subject to be a group or a population, rather than individuals.

This ends up becoming a rather large question to consider as it brings up some troubling metaphysical questions, namely that identifying a group as a unit of interest often first requires an understanding of how we define an individual. Such questions become important when considering complex social structures, like in eusocial insects where the interests of individual insects are not easy to distinguish from one another; in questions of scale, where large-scale systems function in a way that cannot be explained by only its composite parts; and in consideration of genetic cloning.

In the current project I do not try to make claims about what constitutes an “individual” versus a “group”. Though these are important questions, I instead take it as an assumption that individual animals indeed exist and that zoologists can reliably differentiate individuals from non-individuals. Most importantly, this project focuses on the research approach taken on by zoologists. This means that I am interested in how *the zoologist* defines the subject they study. The perspectives, expertise, and disciplinary assumptions used by zoologists to identify their study subject ought to be taken seriously when defining the participating actors in the zoological research relationship. Whether a zoologist sees themselves engaging with individual chimpanzees or working with an entire species, their research approach is shaped by the relationship they see themselves having. This is typically straightforward in zoology because the discipline is focused on studying animals, and the constraints of such research means that individual subjects or individual model subjects are, conceptually, close at hand.⁶ I do not constrain the type of subject a researcher sees themselves engaging with because the current project queries how the perspective taken by zoologists influences the way they create knowledge.

⁶ Further work would do well to examine the different parties that could be involved in the zoological research relationship. Interestingly, this may allow us to expand our understanding of the research relationship beyond zoology and into less obvious fields, like botany, microbial biology, or even cytology. I return to this briefly in my final conclusion.

2.3 Research approaches in zoology

2.3.1 Disinterest in science

To understand how a researcher's state of interest toward relationality influences their scientific approach, I start by analyzing how science has been, and continues to be, thought of in philosophy. Older, more traditional Western approaches to the creation of scientific knowledge have positioned the researcher as an uninterested, objective observer whose role is to conduct research impartially. In a classic critique of this traditional view, Alison Jaggar describes the habit within Western epistemology to focus on reason, rather than values and emotion, as the primary tool for creating knowledge (1989). This is held within a positivist approach to epistemology, or an approach in which raw data collected by human senses is processed through rules of inference to create knowledge. According to Jaggar: "positivism stipulated that trustworthy knowledge could be established only by methods that neutralized the values and emotions of individual scientists," (1989, p. 152).

Helen Longino echoes this idea. She describes the traditional view of value-free science as a view in which contextual values – or, personal or group values stemming from social habits and culture – do not overlap with constitutive values – or, the values internal to science that set the rules that define acceptable scientific practice. On this traditional view, contextual values do not shape the "inner workings of scientific inquiry, in reasoning and observation," (1987, p. 54). In the traditional approach to science, emotion and personal values do not influence investigative decision-making within scientific practice.

Classic challenges to the traditional, value-free, uninterested, or objective ideal for creating scientific knowledge have offered a view of science that sees a scientist's values. I focus here on the critiques and alternatives offered by feminist and social epistemologists. Both Jaggar (1989) and Longino (1987) identify that it is not possible to have a complete separation of social and cultural values from scientific processes. Jaggar sees social values as underlying decisions about what problems, hypotheses, and solutions are worth investigating (1989). Indeed, Jaggar describes emotions and values as necessary parts of all knowledge creation; underlying values and emotions direct scientists toward potential problems, questions, and answers. Jaggar points out that traditional approaches to science implicitly assume dominant societal values as "neutral". Longino points out that the assumptions used to connect data and theory are often motivated by contextual values.

Hilary Rose mirrors Jaggar and Longino when she describes what she calls the "myth of the neutrality of science" (1983, p. 78). In this, she outlines that scientific processes are tied closely to industry and production and that a value-free ideal is privileged even when scientific outcomes have obvious political and social implications, as in the creation and testing of napalm (1983, p. 79). Rose instead calls for a feminist reconceptualization of science in which the social implications of scientific knowledge are integrated into research from the start. These alternative approaches to knowledge creation in science stress that the value-free ideal for scientific research is impossible and that values are not always harmful to scientific knowledge creation.

These alternative approaches present the researcher as an important part of the creation of scientific knowledge. For example, Longino (1987) identifies that the assumptions researchers make in their research influence the creation of knowledge. A researcher who observes their own personal commitments in their scientific practice can start to construct research programs that are aware of underlying assumptions, both in their own program and the work of others. And Jaggar's (1989) analysis of implicit values in scientific practice is clear on the importance of the investigator: "theoretical investigation is always purposeful, and observation always selective," (1989, p. 167). She explains that "outlaw" emotions held by researchers, or emotions that are incompatible with the dominant perceptions and values in society, can act to shape the types of investigations and perception of the world taken up by a researcher. By influencing and making decisions regarding what and how to conduct research, a researcher affects the potential knowledge outcomes of their research.

Current theoretical approaches to science recognize and accept that scientific activities involve many sorts of values. Heather Douglas (2014) offers an account of scientific practice that incorporates values without sacrificing rigour, objectivity, or the like. Douglas (2014) differentiates the roles of epistemic values (i.e., values about theory-choice, e.g., empirical adequacy, simplicity) from non-epistemic values (i.e., values that do not apply to theory-choice, e.g., social values, moral values, cognitive values). She uses this distinction to outline that each group of values plays a different role in the creation of scientific knowledge. Epistemic values are important for evaluating our knowledge, especially

regarding uncertainty, and non-epistemic values are used indirectly to make other decisions, like whether evidence is enough (Douglas, 2014, p. 619). This account of scientific inquiry offered by Douglas demonstrates an acceptance of values within science.

2.3.2 States of interest toward relationality

In this section, I distinguish research approaches according to the state of interest a researcher has toward relationality. Specifically, I contrast a research approach with a high state of interest toward the research relationship to a research approach with a low state of interest toward the research relationship. I apply conceptual tools from relational theory to do this.

Recall that relational theory, as I outlined it in Chapter 1, refers to an analytical approach that takes relationships (rather than isolated individuals) as the main unit of study. Paying attention to relationships means taking seriously the meaningfulness of relationships (Code, 1987), that individuals exist within social and political contexts (Nedelsky, 1989), and the capabilities of the parties who are involved in a relationship (Keller, 1997). Each of these dimensions helps to shape what the “high state of interest toward relationality” research approach might look like. I perform this analysis within the current non-value-free view of science, focusing (more narrowly) on how the acceptance or non-acceptance of certain values around relationality can influence scientific work.

Two zoologists are likely to approach and structure their research identically in many ways, largely due to the structures outlined by scientific processes and the disciplinary

assumptions, expectations, and interests conferred by zoology as a discipline. Jane Goodall was not the first or only chimpanzee researcher active during the time of her research program, and her research program would have been identical to other chimpanzee research on certain axes (e.g., in species of interest, units of interest, observation methodologies, behaviour coding methodologies, and questions of interest). But there were still meaningful differences between the research approaches used in Goodall's research program and other active research programs on chimpanzee behaviour. I propose "state of interest toward relationality" as a branching point between these different programs.

In other words, I am interested in differentiating (a) a research approach where a zoologist is interested in and takes seriously the zoological research relationship from (b) a research approach where a zoologist has low or no interest in the zoological research relationship. Let me start with latter, or a research approach with a low state of interest toward relationality. This sort of approach recognizes that some zoologists are either not interested in integrating the research relationship with their research or are actively interested in not engaging the research relationship. Maria Botero (2020) and Amanda Rees (2007) explore the different views of the observer-observed relationship in field research on primates. Within her investigation of popular accounts of primate behaviour research, Rees identifies a norm in which "the researcher should remain detached from the animals' lives," (Rees, 2007, p. 885), with the intention to avoid manipulation and allow for primates to be studied in unaltered ways. Botero also identifies "detachment" as a traditionally ideal sort of approach to primate behaviour research (2020). This research view reflects some of the

traditional Western epistemological view of scientific practice in which the researcher strives for detachment from their subject and value-neutrality to support the creation of objective knowledge. This approach is not value-free, but it is free of values in support of relationality.

The “high state of interest” research approach recognizes that some zoologists *do* value the zoological research relationship and choose to structure their research by paying attention to this relationship. Goodall’s field program offers a clear example of research in which the researcher has a high state of interest toward the zoological research relationship. Goodall describes her methodologies in *The Chimpanzees of Gombe* as following an “underlying philosophy of noninterference and the building of trust between observer and subject,” (1986, p. 43). Two significant features of Goodall’s approach suggest it features a high state of interest toward relationality: 1) the naming of study subjects and 2) acceptance of social contact. Each of these decisions requires a recognition of the zoological research relationship and a recognition of the role a study subject can play in the research.

It is important to note that some aspects of Goodall’s technical methods do not require complete buy-in and commitment to cultivating a relationship with the study subject. The idea of noninterference, for example, refers to the goal to maintain social distances between the observer and the observed. Further, as the research program grew, the view of social contact between the observers and observed changed: “Researchers were asked not to approach their subjects any closer than about 5 meters and to try to ignore, or move away from, any friendly – or unfriendly – advances that might be made,” (Goodall, 1986, p. 58). I note this because I want to clarify that research approaches with a high state of interest

toward the zoological research relationship can be complex. One hundred percent commitment with no room for change does not reflect the dialogic nature of relationality. What *is* important to this approach is that the researcher takes the meaningfulness of the researcher-subject relationship as integral and valuable to their research.

Goodall's research approach was focused on appreciation and respect. She dedicated an entire section of her methodologies appendix in *The Chimpanzees of Gombe* to this very topic, which helps clarify the intentions behind her methodologies. Goodall wrote:

In order to maintain the animal-human relationship of mutual respect, tolerance, and trust that was built up during the early years at Gombe, I laid down certain rules of conduct for the field workers. Observers, whenever possible, were to maintain a distance of about 5 meters between themselves and their subjects; they were not to move between two chimpanzees, particularly a mother and members of her family, if it could possibly be avoided; they were not to talk loudly or make sudden movements; ... if a chimpanzee seemed excessively nervous during a follow, they were to drop back, then if the animal was still upset, discontinue observations... (Goodall, 1986, p. 604)

And Goodall's next paragraph demonstrates the difference in approach taken up by researchers with lower states of interest toward the research relationship:

Almost all the American and European research personnel who have worked at Gombe came because of an interest in (and often love of) animals. In some cases, however, when individuals were highly motivated academically to collect as much information as possible (for doctoral dissertations, for example), they disobeyed some of the rules. For instance, they would move between a mother and her older child in order to record, in as much detail as possible, her interactions with her infant. (Goodall, 1986, p. 604)

The intent of Goodall's program was to describe the behaviours of free-living chimpanzees. She did this by paying careful attention to the relationship that was cultivated between researchers and the chimpanzees. Study subjects, on Goodall's approach, were given recognition as valuable parts of the research practice, with their own sort of agency and ability to offer feedback. The chimpanzees were presented as capable participants in the relationship.

In sum, Goodall's research program not only featured relationality by virtue of the zoological research relationship, it also recognized and incorporated that relationship in its scientific activities. Goodall used the research relationship with individual chimpanzees as an integral part of data collection. For example, certain behaviours and contexts of behaviours could be observed by recognizing and interacting with individuals across time. And this

differs from other approaches that seek to distance the researcher from the study subject, and to set aside any affective experiences a researcher has toward the study subject. Such cases might focus on more abstract sorts of data, or on resisting certain personal interpretations of an observation. Though relationality is fundamental to zoological research, zoologists differ in how they use that relationality in their knowledge-producing processes.

2.4 A case of the creepy or uninteresting: Eugenie Clark and sharks

An interesting question remains: Does this conception of research with a high state of interest toward the zoological research relationship travel well to other research environments? After all, zoology is a broad discipline, chimpanzees are one of the closest relatives to humans, and many animals are incredibly foreign or simply unengaging to humans. To analyze this, I will introduce a second case study for consideration: that of Eugenie Clark and her work with fishes, namely sharks.

Clark was an ichthyologist whose work focused on the ecology and natural history of tropical fishes. Clark actively participated in scientific processes starting with her work as a student of zoology in the 1940s until her death in 2015 (Balon, 1994b; McFadden, 2015). Her research and public communications have been credited with making sharks accessible and interesting to general publics (Balon, 1994b, pp. 89–90). Clark uncovered and described novel phenomena in multiple fishes, including reproductive habits, inter-species interactions, and respiration physiology (Balon, 1994b). Importantly, her research shifted how Western science thinks about shark behaviour.

To demonstrate Clark's high state of interest toward relationality, I return to Code's focus on the meaningfulness of relationships and Keller's "moral agent" view of individuals. Clark held a thorough enthusiasm for understanding the habits of marine life and fishes. This enthusiasm started for Clark in childhood where her time observing sharks at the New York Aquarium shaped how she thought of science. Clark saw her work with fishes as meaningful. In Clark's words: "I thought the sharks were beautiful, graceful, and magnificent. It was my dream to learn more about them and all the other beautiful and wondrous smaller fish," (Balon, 1994a, p. 121).

This meaning and motivation is clear in the breadth of Clark's work. Clark's study sites were located across the globe and included the Caribbean, Red Sea, and caves in Mexico and Japan (Balon, 1994b). Her scientific work was both laboratory- and field-based, and she was proficient in both settings. Clark's field work required extensive full water submersion – primarily SCUBA diving and deep dives in submersibles – which meant she was consistently in field settings that are unfamiliar and challenging to humans (literally unfamiliar waters). In contrast to Goodall's landmark work that focused on one major group of chimpanzees, Clark's research was tied to various sorts of fishes. Throughout her career, Clark participated in research relationships with whale sharks, seamoths, sole, manta rays, groupers, lemon sharks, among many others (Balon, 1994b). Though this engagement could result from a different sort of interest on Clark's part (e.g., in adventure, which it likely was, in part), I return to her motivation. Recall she "thought the sharks were beautiful, graceful, and magnificent" and it was her "dream to learn more about them," (Balon, 1994a). Such

statements confer a weighty affective connection between Clark and fishes. Alone, however, this is not enough evidence to demonstrate a high state of interest in relationality for all of Clark's research.

Clark's research on learning behaviours in sharks, though, demonstrates her interest in sharks as capable agents. This work occurred at the Cape Haze Marine Lab, Clark's laboratory, where she housed captive sharks. In her book *The Lady and the Sharks* (1969/2010), Clark describes her work with live individuals as one of the most interesting aspects of her research. In these descriptions, Clark is attentive to and interested in the individuals she studies. She describes one female lemon shark in particular as "One of the most extraordinary sharks [she] ever got to know," (1969/2010, p. 97). Clark was interested in how this shark changed over time, from capture, to adjusting to captivity, to bearing pups. The attention paid by the Cape Haze researchers toward their captive sharks sparked further research into the trainability of sharks. The researchers knew their captive sharks well, including their optimal feeding habits and that the sharks were indeed responsive to food. Because they understood each shark's interests and capability to interact with researchers (e.g., during feeding), Clark and other researchers in the laboratory began to perform classical learning behaviour experiments on the sharks (1969/2010). They had outstanding success in demonstrating learning behaviours in lemon sharks.

Clark's work with sharks benefitted greatly from a high state of interest in her relationship with sharks. Before her research, the popular views of sharks, even within

science, held them as cold, unfeeling, and extremely dangerous animals (1969/2010). Clark was able to challenge this notion by conducting research that paid attention to individual sharks. Sharks were thought to be incapable of learning, but Clark's work with these sharks demonstrated otherwise.

Even within the kingdom of Metazoa, however, sharks are among the more charismatic of animals. It is likely easier for a human to recognize and experience some kind of interesting relationship with a shark compared to a jellyfish, zooplankton, sponge, or coral. Many of these animals do not behave in ways that are familiar to humans, making them uncharismatic and difficult to interact with. But I hesitate to say that relationality cannot be part of a zoologist's research if they work on extremely foreign, uncharismatic animals.

Instead, I urge us to focus on the intuitions and interests of the zoologist. It is possible, and even likely, that zoological research relationships that involve uncharismatic animals will differ in their specifics compared to those involving more charismatic animals. Zooplankton cannot respond to a researcher in the same ways as chimpanzees or sharks but might exhibit other behaviours or habits that are intriguing to the zoologist who studies them. If a zoologist holds a strong connection to an uncharismatic organism, then that is what is relevant to the project at hand; my intention here is to examine how a researcher's interest in their research relationships influence how they create knowledge, after all. Many people likely would have thought that developing a strong relationship with sharks was impossible, but Eugenie Clark did just that.

2.5 Conclusion

In this chapter, I have described and examined the role played by the relationship between zoologists and their study subjects. I sought to map out what exactly the research relationship refers to in zoological research: namely, the connection between a zoologist and an animal by virtue of the research being performed by the zoologist. Following this, I argued that we can use the research relationship to distinguish two sorts of research approaches in zoology. The first is a research approach in which a zoologist has a high state of interest toward their research relationships with their study subjects and the second approach involves a zoologist having a low state of interest toward their zoological research relationship. Understanding the research relationship and how it can shape zoological research helps to lay the groundwork for further inquiry into the influence relationality might have on knowledge creation in zoology.

Chapter 3:

The Relational Approach, Knowledge, and Ignorance in Zoology

One of the interests of philosophers of science is in describing how scientific knowledge is created. Full accounts of knowledge, however, require complementary accounts of ignorance (Fehr, 2008a; Tuana, 2004). Just as the negative spaces of a painting create a clear view of the painting's subject, understanding how we – humans – do not and cannot know helps create a clear view of the shape knowledge and understanding might take. This is especially important when seeing knowledge creation as a social act because it helps show why and how knowers contribute uniquely to science.

In the previous chapter, I demonstrated that a researcher's state of interest in relationality can influence scientific practice. This can be in the development of methodologies, choice of research topic, and the sorts of data a researcher collects. In this chapter, I show how a zoologist's state of interest in relationality allows them to navigate specific types of ignorance about their study subjects. I argue that a research approach where a zoologist has a high state of interest toward relationality offers unique epistemic benefits by allowing zoologists to circumvent and/or respond to the creation of some forms of ignorance.

My intention in this chapter is to analyze how research approaches with a “high state of interest toward the zoological research relationship” might influence the creation of seven types of ignorances. I start, in section 3.1, by using works from Nancy Tuana and Mariana

Ortega to develop a typology of seven ignorances. This forms the epistemological foundations of my analysis.

I follow this with my analysis of the potential epistemic benefits offered by a relational research approach. I conduct my analysis using both historic and contemporary works in zoology that feature a relational research approach. These include that of Hal Whitehead and his work with sperm whales, Jane Goodall and her work with chimpanzees, shifts in animal intelligence research on octopuses, and Justin Gregg and his approach to dolphin communication research. These cases span multiple research topics in zoology: complex sociality, animal behaviour, communication, and general ecology. My intention here is to avoid limiting my analysis of the relational research approach to only certain sorts of research topics. Though these case studies will help demonstrate epistemic benefits of the relational approach, I also use some of them to discuss how high states of interest in relationality may lead to other types of ignorance just as it responds to another.

3.1 Epistemology of ignorance

Most work on the epistemology of ignorance starts by recognizing that “epistemology of ignorance” is a rather strange phrase; this is true. Epistemology refers to the study of knowledge, but ignorance is decidedly not knowledge. Ignorance, however, is not a simple lack of knowledge, as it has been taken popularly and in scientific fields (R. N. Proctor, 2008; Tuana, 2006). Rather, ignorance is something that can be constructed. Work on what we *do not* know and how we *do not* acquire knowledge or *do* acquire ignorance is work on the epistemology of ignorance.

Charles Mills introduced the concept of “epistemologies of ignorance” in his book, *The Racial Contract* (1997). In this book, Mills discussed the construction of racial oppression as part of European imperialist endeavours in recent centuries. He specifically analyzed how White supremacy functions as an implicit social contract that people take up to maintain an oppressive social order. Central to this contract is what Mills described as “*an inverted epistemology*” (1997, p. 18, emphasis in original) used by White people – those who subscribe to white supremacy – to validate and confirm their status as superior to non-white people. The inverted epistemology is “*an epistemology of ignorance*” (Mills, 1997, p. 18, emphasis in original). Here Mills referred to a pattern of cognition in which ignorance is intentionally and systematically cultivated. In the racial contract described by Mills, ignorance is cultivated as a way of maintaining the status quo; if White people do not know about their role and privilege within society, then they cannot change the racial contract or work to subvert White supremacy.

The concept of cultivated ignorance has been an important avenue of investigation in feminist philosophy of science. Nancy Tuana (2004) analyzed the creation of ignorance about the female orgasm. Focusing on both feminist and nonfeminist research on the female orgasm, Tuana chronicled how ignorance was created through misguided investigations and losses of knowledge, and how knowledge was reclaimed through self-focused investigations by feminists. And Carla Fehr (2008a) examined how ignorance about women’s under-representation in higher academia and science has been sustained even with continued efforts to demonstrate knowledge of women’s under-representation. Each of these pieces

demonstrate that ignorance stands on its own, not as a simple lack of knowledge, but as something that is made. Ignorance is created just as knowledge is created, and a full understanding of what we *do* know must include what we *do not* know.

I am interested in using the epistemology of ignorance as a foundation for analyzing the potential epistemic implications of relational research approaches in zoology. To do this, I turn to works that have sought to organize and delineate the sorts of ignorances that co-occur with knowledge. Tuana (2006) offers a taxonomy of ignorance that I find most useful, if incomplete. For this reason, I will start with Tuana's taxonomy to build a framework for analyzing the relational research approach.

Through the lens of the women's health movement, Tuana (2006) offers a taxonomy of ignorance, outlining six ways that ignorance can be generated and maintained. First, she describes "knowing that we do not know, but not caring to know", a kind of ignorance that comes from what researchers choose to research, or their "configurations of interest" (2006, p. 5). This type is tied to patterns of power in that patterns of interests are often guided by the values and goals of the powerful. The second type, "we do not even know that we do not know", occurs when a state of knowledge or interest blocks knowledge about other topics. This relates to the first as once one becomes aware that they did not know something, they may still choose to pursue another topic; this second kind of ignorance becomes the first if interests still guide inquiry away from certain topics. Third, is "they do not want us to know", where knowledge exists, but the knowing group keeps it hidden from others. The fourth, "willful ignorance", involves actively choosing ignorance, or choosing to ignore something

that is known by others. Mills describes this in the context of White Supremacy, where White people actively choose and use cognitive dysfunctions to ignore the structures of racial oppression that benefit them and harm others (1997). Fifth, Tuana describes “ignorance produced by the construction of epistemically disadvantaged identities”, where some knowers are stripped of credibility and are deemed “not knowers” by other individuals or groups. And sixth, is “loving ignorance” or a kind of ignorance in which a knower uses the experience of love and care to accept that they cannot know some things, like the full complement of another’s experience.

Tuana is clear that her taxonomy is not exhaustive,⁷ and that she develops the taxonomy by using feminist efforts to respond to and shape ignorance and knowledge. One account I do wish to add to Tuana’s taxonomy is one put forth by Mariana Ortega in “Being Lovingly, Knowingly Ignorant: White Feminism and Women of Color” (2006). In this work, Ortega offers “loving, knowing ignorance” as a type of ignorance-producing arrogant perception. Ortega develops this type of ignorance in conjunction with what she calls “arrogant ignorance”, a type of ignorance where a knower sees their world arrogantly and with no intention or interest in understanding the objects they perceive (via Frye, 1983). Loving awareness is the complement to arrogant awareness and occurs when a knower aims to see the subjects of their perceptions as individuals with their own projects. Loving,

⁷ Other scholars have conducted similar work on sorting out different types of ignorance. For example, Proctor (2008), discusses ignorance in terms of industrial practices in science. And Alcoff (2007) outlines three types of ignorance that arise from how a knower is socially situated. It would be fruitful for future research to engage these works.

knowing ignorance comes from some strange middle ground between arrogant and loving perceptions. Instead of refusing to see the perceived, those who are lovingly, knowingly ignorant aim to love and construct knowledge about the perceived. Ignorance is created on this view when the knower loves and constructs knowledge in ways that are not appropriately attentive to the perceived and view the perceived as something that helps them reach their own ends. Ortega frames her analysis in terms of the perceptions of white feminists toward women of colour: “Thus we may find the feminist who wants to perceive lovingly, who wants to see women of color on their own terms ... but who, despite her well intentions, turns women of color into something that can be used to further her own desires” (2006, p. 61).

Ortega’s work offers a type of ignorance not wholly covered in Tuana’s taxonomy; loving, knowing ignorance recognizes that incomplete, uncaredful good intentions might act to create ignorance. Using the phraseology of Tuana’s taxonomy, we might cast loving, knowing ignorance as something like “Trying to know, but doing so incompletely”.

To analyze the epistemic role of a high state of interest toward the zoological research relationship, I develop an adjusted typology of seven forms of ignorance. Tuana uses the term “taxonomy” to describe her approach above, which suggests that there are clear boundaries between each type of ignorance she outlines. My intention is not to create a strict outline of different types of ignorance, with a clear lineage of sorts that represents the connections between each type of ignorance. Instead, I offer a typology as a way of identifying the different dynamics involved in the creation of ignorance, while still

recognizing that some situations involve multiple types of ignorance. With this in hand, I offer each of Tuana's six types of ignorance, with an added seventh from Ortega:

1. Knowing that we do not know, but not caring to know;
2. We do not even know that we do not know;
3. They do not want us to know;
4. Willful ignorance;
5. Ignorance produced by the construction of epistemically disadvantaged identities;
6. Loving ignorance; and
7. Loving, knowing ignorance.

Next, I seek to analyze how research approaches where a zoologist has a high state of interest toward the zoological research relationship might influence the creation of each of these seven ignorances. For organization's sake, I treat "loving, knowing ignorance" sixth and "loving ignorance" last.

3.2 Possible epistemic benefits of a relational approach

In Chapter 2, I identified a difference in how some zoologists engage with relationality in their research. I outlined two research approaches that differ in how interested a researcher is in the zoological research relationship: an approach with a high state of interest toward relationality and an approach with a low state of interest toward relationality.

The approach where a researcher exhibits a high state of interest toward their research subject is interesting because it clearly demonstrates that the interests, values, and

experiences of a knower can influence knowledge. More importantly, it demonstrates that a knower's interest in relationships *themselves* can influence the creation of knowledge. I demonstrated in Chapter 2 that insights from relational theory can clarify the ways relationships influence who can know and what can be known. Considering the epistemology of ignorance, then, insights from relational theory can also help clarify the way relationships influence who are excluded as knowers, what can be ignored, and what knowledge is hidden. The work I do here is exploratory and the connection between zoological research and some forms of ignorance are wont to be more intuitive and obviously useful than others.

Relational theory also tells us that relationships are complex and can involve multiple sorts of dynamics simultaneously. This is important to recognize when analyzing how high states of interest toward relationality might influence the creation of ignorance. Because of this, there is often overlap between types of ignorance. For instance, a researcher who responds successfully to one sort of ignorance, might simultaneously construct another, or their response to one sort of ignorance might simultaneously address several others. This is especially apparent in cases that respond to “we do not even know that we do not know” or “willful ignorance” because both involve some sort of social or cognitive block. I will attempt to make these distinctions clear here, but there is likely to be some overlap in other applications of this typology.

3.2.1 As a response to “knowing that we do not know, but not caring to know”

The research approach with a high state of interest toward relationality starts to respond to Tuana's “knowing that we do not know, but not caring to know” by influencing

how a researcher's interests are configured. Recall that this sort of ignorance results from what one chooses to pursue in research, which comes from one's own interests and the patterns of power that structure what interests are "worth" pursuing. A zoologist who takes their relationship to their research subject seriously exhibits a configuration of interest that will take them toward research that is subject-centered. Because this focus on the research subject is born from a zoologist's interest in their research subject, that zoologist can investigate different questions from a researcher who does not care to focus on their subject. The dominant, value-free research approach in zoology in which a zoologist holds a low state of interest in the research relationship will create knowledge that is not configured toward caring to know about the subject as a participant in the research.

Think, for example, about research on sperm whales. Most early (18th century) Western scientific research efforts on sperm whales were guided by the whaling industry (Whitehead, 2003). As sperm whales presented one of the best resources of spermaceti oil (i.e., a substance used for things like industrial lubrication and candles) and blubber, they were pursued at great length (Whitehead, 2003). Many early descriptions of sperm whales resulted from observations made during sperm whaling expeditions. It was only into the 20th century that research on sperm whale behaviour began to extend beyond observations made during industrial activities (Whitehead, 2003).

Hal Whitehead and Jonathan Gordon's 1982 studies of the behaviour of living sperm whales in the wild offer an early example of work that is configured by something other than the whaling industry. When describing work on behaviour via long-term studies of

individuals, Whitehead describes a transition in biology toward taking longer time scales as a way of understanding sociality (through, e.g., Jane Goodall's work with chimpanzees). Such work is made more difficult by the nature of oceanic field work, but, Whitehead explains, "a few farsighted cetologists recognized that if individuals could be followed, or at least repeatedly identified, over long periods, this would open a whole new field of insight into social relationships" (2003, p. 22). Whitehead's work on sperm whales demonstrates such far-sightedness. Whitehead's work continues to be instrumental in studying social behaviour in animals more generally, largely because of the statistical analyses that resulted from his work.

Whitehead's approach in much of his work on sperm whales exhibits a high state of interest toward his connection to the sperm whales he studies. He demonstrates a view of whales in which they are capable individuals (Keller, 1997) and with whom he feels meaningfully connected (Code, 1987). A quote from a 1985 expedition in the Galápagos demonstrates his interest:

During the weeks that we spent with sperm whales, the subjects of our research showed themselves to be gentle animals. They are usually shy but occasionally curious in the presence of humans and their boats. They show no shyness, however, with each other, displaying very sociable behaviour. (Whitehead, 2003, pp. xix–xx, an excerpt from *Call me gentle* by Whitehead in 1989)

Beyond just making observations, Whitehead presents individual behaviours and individual shifts in behaviours as scientifically important. Sperm whales can be shy, but also occasionally curious. Sperm whales also make judgements about when to be shy, demonstrating no shyness with other con-specifics. His interest in whales as individuals has helped him open up different configurations of interest regarding cetacean social behaviour.

It is also possible that the relational research approach may help to re-configure interests, both of others and of the powerful. Science is intensely social, so if the configuration of interests influences research avenues, it seems likely that anyone who introduces new interests into scientific activities might, in turn, re-configure larger interests. In the case of Whitehead's research on sperm whales, paying attention to individual whales despite the practical challenges of ocean field work, helped demonstrate that such work is possible and valuable. Sociality is now a huge part of cetacean research programs and, though Whitehead's research is not solely the cause of this, it is likely that his early interests in whale sociality beyond what was offered by the whaling industry helped spur such research on.

3.2.2 As a response to "we do not even know that we do not know"

Researchers can respond to the "we do not even know that we do not know" type of ignorance by using their attention to the zoological relationship to unblock avenues for inquiry. In this type, current states of knowledge, interests, and beliefs preclude researchers

from being aware that they are ignorant. A research approach where a researcher has a high state of interest in relationality can offer a perspective that differs from the perspective given by a low state of interest. Each view of the zoological research relationship will shape how knowledge and evidence are framed by the researcher. If the current state of knowledge is based on a research approach that encourages disinterest and features a low state of interest toward relationality, then the high state of interest approach can help uncover knowledge or lines of inquiry that have been obscured under that dominant approach.

Jane Goodall's work with chimpanzees offers a useful example for demonstrating how relationality may help a researcher become aware of something they do not know. One of Goodall's landmark achievements in chimpanzee research was her description of the fashioning and use of tools by chimpanzees in the wild. In Western science, tool development and use were previously thought to be unique to humans (Botero, 2020; Goodall, 1986). At the time of Goodall's research, prevailing views of animals positioned humans as more sophisticated agents compared to non-human animals (Birke, 1994). These prevailing, distanced views of non-human animals separated "humans" from "animals". Such a view presented chimpanzees as "mere animals", which are not capable of the sophisticated skills that are unique to humans (e.g., tool use).

I established in Chapter 2 that Goodall's research program exhibited a high state of interest toward relationality. Under this approach, Goodall framed chimpanzees as capable individuals. Goodall was interested in her study subjects as individuals and saw them as

active participants in the research program. This helped shift the hierarchies that dictated what “humans” versus “animals” were capable of.

Under a prevailing view that sees chimpanzees as “mere animals”, the option for a chimpanzee to use tools does not even exist. Even with evidence that a chimpanzee is using tools, the option to describe tool use in a chimpanzee could not even exist because tool use is uniquely human; a researcher does not even know that they cannot know such a thing. Goodall’s view presents chimpanzees as not “mere animals” but capable individuals, which helps push past the belief that humans are the only organisms capable of sophisticated behaviours, like tool use. This opens up the possibility that chimpanzees might behave similarly to humans and helps Goodall see tool use in chimpanzees as something that “we might not know” and then describe it.

3.2.3 As a response to “they do not want us to know”

This type of ignorance is frequently understood as something perpetrated by powerful social groups to maintain their power. This is often true. Tuana’s (2006) keystone example for “they do not want us to know” ignorance concerns how the side effects of the birth control pill were hidden from women by experts. How I see the relational research approach responding to this type of ignorance, however, comes from a slightly different approach. A researcher who has a high state of interest toward relationality will have a meaningful connection with their study subject (Code, 1987). If that meaningful relationship is based on positive affective experiences, oppressed social groups may feel encouraged to share knowledge they have kept hidden for their, and their knowledge’s, own safety.

I see this happening in two ways. The first has to do with the *connections between human knowers* in scientific knowledge production. “They do not want us to know” describes a type of ignorance in which a knowing group keeps something hidden from others. As in Tuana’s example, *this often involves a group of human knowers who keeps knowledge away from another group of human knowers*. This can be seen in social approaches to knowledge creation, which say that different groups of people contribute different perspectives and interpret data differently to create new knowledge.

We can see this in the dynamic between Indigenous scientists and traditional ecological knowers and Western scientists. Western science is structured by a society in which white, middle-class, older men hold power. This means that Western science’s foundational “neutral” approach is not actually neutral and has functioned to maintain oppressive power structures within science and in Western society (Jaggar, 1989). Western scientists are known to exploit and colonize Indigenous knowledges (Battiste & Henderson, 2000). For this reason, some oppressed groups of humans have kept knowledges hidden from colonial scholars as a protective act (e.g., as discussed at length by Battiste & Henderson, 2000).

The research approach where a scientist has a high state of interest in relationality offers an alternative approach to the traditional Western view described above. Because of this, it may make a researcher more trustworthy to the human knowers who keep their knowledge away from Western oppressors. The relational research approach may indicate or signal that a zoologist is trustworthy to know sensitive knowledge. It may also be the case

that a zoologist who has a high state of interest in their relationship with a study subject holds values and beliefs that will prevent them from taking knowledge without consent, respect, or acknowledgement of the sensitive knowledge-holders (Battiste & Henderson, 2000).

There is, however, a risk of harm when a researcher uses the research relationship to pursue knowledge in this way. I focus on this sort of example because it helps demonstrate that there are complicated dynamics at play when considering knowledge- and ignorance-creation. A relational research approach does not guarantee that a researcher is trustworthy to other humans. A researcher who is interested in their study subject may not also be interested in creating knowledge in anti-oppressive ways. In cases where a relational research approach encourages an at-risk group of knowers to share their knowledge with an untrustworthy researcher, or where a researcher uses this approach to gain epistemic access to protected knowledges, the “they do not want us to know” may turn into “loving, knowing ignorance”.

The second way that a high state of interest in relationality may help a researcher circumvent “they do not want us to know” ignorance has to do with *the study subject* deciding to let a human researcher know what they know. *In this case, the knower who is obscuring knowledge is the animal being studied.* This is a somewhat more difficult interpretation because it is unclear in Western science whether and to what extent intentionality may be ascribed to non-human animals. If we are not sure that a non-human animal can intentionally share knowledge or give gifts, then it does not seem apt that said non-human animal could be obscuring, then showing their knowledge to a human researcher.

However, this idea still might have legs. Scientific research on reciprocity and sharing in corvids (e.g., crows, ravens) has demonstrated that con-specific sharing is not uncommon (e.g., seen in Fraser & Bugnyar, 2012; Heinrich, 2002). And cases where a corvid gives a gift to a human, not a con-specific, is not a rare anecdote. (Though there is little, if any, formal documentation of this phenomena). Often, such “gift giving” is done after a human has done something helpful, like rescued or fed the corvid. A researcher who has a high state of interest in their subject has the potential to cultivate a positive, potentially trusting relationship between themselves and their subject. This leads me to wonder if a positive relationship cultivated in a relational research setting might encourage a study subject to show the researcher something they had previously hidden from them. A raven who collects valuable objects might not choose to share such a collection unless a researcher is suitably friendly. Could these cases be responsibly interpreted as an individual raven revealing that they do, in fact, find shiny items interesting and valuable? I do not have a clear answer to these queries, but I offer them as a way of thinking about how study subjects might participate in creating ignorance and knowledge about their own habits.

3.2.4 As a response to “willful ignorance”

Willful ignorance refers to ignorance that is created when a knower chooses to avoid or neglect knowledge. In the context of zoological research, then, this type of ignorance would apply to a researcher who actively chooses to be ignorant. Responding to this type of ignorance would involve the researcher choosing to pay attention to or accepting the knowledge they intentionally neglect. A research approach that is oriented toward the

zoological research relationship, or that takes seriously the role of the study subject in research, might help respond to willful ignorance by making a researcher confront certain facts about the world that make bigger knowledge claims difficult to ignore.

Some dynamic like this might be seen in research on animal intelligences, namely concerning the inclusion of octopuses as intelligent organisms. Cephalopods are a type of mollusc, meaning that they are invertebrates, animals without a spinal column. Research into the evolution of intelligence has frequently started from the position of the human, a vertebrate who we (humans) know to be smart. Early investigations into animal intelligence sought to explain intelligence by tying complex abilities to complex brains (Hodos, 1982; Schnell & Clayton, 2019), as can be seen, for example, when comparing the intelligence of a nematode to a human.

But the apparent intelligence of octopuses has offered a challenge to this linear view of animal intelligence. Peter Godfrey-Smith (2016) recognizes that comparing the joint abilities and neural complexity of different animals can be difficult, and that octopuses offer an obvious challenge to this linear strategy. Octopuses have very different nervous systems from vertebrates, but consistently exhibit behaviours that humans would consider quite smart – trickery, thievery, play behaviour, and other kinds of mischief.

Godfrey-Smith notes that scientific demonstrations of octopus intelligence do not really match anecdotes of certain intelligent behaviours. That is, under experimental standards the octopus does not seem as intelligent as individual reports or observations would

suggest (2016). In this case, it seems that a scientist needs to choose between following reports of intelligence in octopuses and using the handy linear view of intelligence with established experimental standards. Someone who uses the linear view of intelligence derived from humans might find it difficult to identify and accept that the standard for intelligence could be skewed toward humans.

This case seems rather similar to that of Goodall's work describing tool use in chimpanzees. Both instances of ignorance result from preconceptions that do not allow the study subject to be seen as capable, engaging, or able to testify and represent their own interests. There is certainly some overlap because ignorance is created in complex ways. The difference I want to highlight in this case, however, has to do with the zoologist's approach to evidence. In the case of tool use, Goodall's approach allowed her to see observations as evidence of something we did not even think was possible. In the case of cephalopod intelligence, a researcher's interest in the linear model may prevent them from taking evidence against the linear model seriously.

A researcher who is highly interested in their connection with the octopuses they study, however, may give new weight to the behaviours of individual octopuses. They may be less likely to resist or set aside strange anecdotes – like of an octopus who only squirts one handler, or another who does not like when the lights are on and consistently turns them off – in order to maintain the linear model of intelligence.

Instead, researchers who have paid heed to such interactions between researchers and octopuses have helped reorient studies of intelligence. Researchers with increased attention toward the individual behaviours of octopus subjects demonstrate a high state of interest toward their zoological research relationship by considering their subjects active participants in the research and as individuals who are shaped by the research environment (Code, 1987). This has opened up new questions, like what different sorts of intelligences in animals might look like and how convergent evolution might be a relevant piece of the puzzle.

3.2.5 As a response to “ignorance produced by the construction of epistemically disadvantaged identities”

In analyzing this type of ignorance, we must remember that “ignorance produced by the construction of epistemically disadvantaged identities” occurs when some individuals or groups are deemed unable to know and are discredited by some other individual or group. This type of ignorance is strongly influenced by social and political contexts, especially regarding the power differentials that exist between groups of knowers. I see two ways that a zoologist with a high state of interest toward their zoological research relationship can respond to this type of ignorance.

The first way we might interpret this type of ignorance relates to the social aspects of scientific knowledge creation (as discussed in section 3.2.3 on “they do not want us to know”). I am concerned here with how a high state of interest in the zoological research relationship can shape how *groups of human knowers interact*. In “ignorance produced by the construction of epistemically disadvantaged identities”, I hold that having a high state of

interest in their zoological research relationship might alter how *a zoologist views a group of epistemically disadvantaged human knowers*. This type of ignorance involves paying attention to the political and social contexts in which a researcher approaches their research, as is recommended in Nedelsky's "social and political embeddedness" view of relationality. This means that paying attention to a researcher's state of interest in the zoological research relationship will involve also paying attention to the social and political values and assumptions they make in their research (e.g., classist assumptions, values around what constitutes expertise).

The integration of local knowledges with zoological research offers a good example of how this might work. In this case, I focus on local knowers who are constructed as epistemically disadvantaged by academic science. A typical structure for scientific research starts with the researcher: what do they know, what are they curious about, how do they think these questions ought to be answered? It is entirely possible that this structure means a researcher will work only with *their* team, in *their* lab, and with *their view* of the study subject – regardless of their state of interest toward the zoological research relationship.

A zoologist who has a high state of interest in their relationship with their study subject may, however, have an added opportunity and impetus for engaging with groups of people outside of their own academic circles. By meaningfully engaging with their study subject, a zoologist may increasingly gain access the political and social aspects of researching their subject, like the communities that are affected by their research. There are some forms of research that do not need this field-based investigation, but a researcher who

is invested in developing a fuller picture of their study subject's life might still opt to do field work. Conducting field research in unfamiliar places both allows a researcher to get to know their subject in the wild *and* may introduce them to groups of knowers who would not be counted as experts from an academic viewpoint. Members of my home farming community may not be practicing zoologists, but they have firsthand knowledge of how moose populations have moved south over the last 20 years in central Saskatchewan. A zoologist who is interested in long-term migrations of moose in regions with extensive agricultural land conversion might do well to see those farmers as epistemically privileged individuals.

Just as with responses to “they do not want us to know” ignorance, knowledge creation that reconfigures who can know risks becoming “loving, knowing ignorance”. This allows us to transition into the next sort of ignorance.

The second way that a zoologist with a high state of interest toward the zoological research relationship may respond to this type of ignorance has to do with how *non-human animals are constructed as knowers*. Goodall's research with chimpanzees offers another useful case for how a zoologist might respond to this ignorance. Recall that traditional Western views of animal hierarchies position humans as more complex and sophisticated than non-human animals. On some versions of this view, non-human animals are objects or simple subjects incapable of self-determination, and humans hold strict power over other animals. Because of their simplicity on this traditional view, non-human animals are not counted as knowers.

High states of interest toward relationality, especially ones that feature Code's "second person" view and Keller's "moral agent" view of relationality, can help to re-configure non-human animals as knowers. Goodall's research approach presented chimpanzees as individuals with their own interests. Each chimpanzee received their own individual name and detailed accounts of personal and familial histories were developed by paying close attention to the actions of individuals. In this, Goodall viewed meaningful relationships as important to the experience and life of each chimpanzee subject (Code, 1987), and each chimpanzee subject as capable of having and acting on their own interests (Keller, 1997).

This view gives new weight to the behaviours of a study subject. A chimpanzee who asks their observer to play is recognized as participating and changing the nature of the zoological research relationship. A chimpanzee who sees their observer as a threat is worthy of respect and care, as in Goodall's methodology appendix: "if a chimpanzee seemed excessively nervous during a follow, [the researchers] were to drop back, then if the animal was still upset, discontinue observations" (1986, p. 604). In some ways, this might seem to be constructing ignorance by removing an observer from their work. This may be the case at times, but I want to focus on other implications of taking the wants and interests of a subject seriously.

Overall, taking the interests and needs of each chimpanzee seriously allowed Goodall to build trusting relationships with each chimpanzee and gain access to a greater part of their lives. Failing to care about a chimpanzee's boundaries, for example, could have sacrificed

Goodall's ability to conduct long follows by preventing any amount of habituation. The seriousness with which Goodall saw chimpanzees as capable knowers also meant that she could rely on the subjects themselves to attune her to the things they found important in their environment. Remember that Goodall went to Gombe with no formal training at a time where very little was known about free-living, wild chimpanzees. Only by observing their behaviours and taking their intentions seriously could Goodall gain some access to their knowledge. This allowed Goodall to, for example, learn the best way to quickly construct a comfortable sleeping nest in the same way as each chimpanzee (Goodall, 1963/2019).

3.2.6 As part of a response to “loving, knowing ignorance”

The dynamics of loving, knowing ignorance are somewhat complex and can easily arise from responses to other sorts of ignorance. Recall that this type, as outlined by Ortega, occurs when a knower tries to create knowledge about some other, but is not appropriately attentive to those they are creating knowledge about. This ultimately means that the knower constructs their subject as some useful “thing” and, in doing so, misses the creation of important knowledge.

A zoologist who gains access to the knowledge of oppressed knowers by virtue of the relational research approach risks creating this ignorance by using that knowledge inappropriately. Even if this zoologist has good intentions in integrating new knowledge, failing to pay attention to that knowledge in its own right may still result in ignorance. It is also possible that this ignorance is more pernicious than other sorts because it is hidden under a veneer of knowledge and inclusion; it uses appreciation to hide appropriation.

This brings up a question of what constitutes a fully relational research approach. It seems that sometimes simply taking on an interest in a study subject might not be enough. Ortega (2006) offers one potential antidote to the creation of loving, knowing ignorance by white feminists. On her account, the knowers who risk creating loving, knowing ignorance must be reflexive and open to engaging with the unfamiliar to learn where their potential for ignorance lies. Ortega engages with María Lugones' (1987) classic notions of play and travelling the “worlds” of others to recommend that a knower directly recognize difference and unfamiliarity. This means that a knower must see the real, experiential, and contextual meanings of those they seek to create knowledge about.

What might this mean in a zoological research setting? When engaging with new, unfamiliar sources of knowledge, the zoologist must recognize the unfamiliarity of the new knowledge they take up. This requires the zoologist to go beyond paying attention to their research relationship and to engage with the social and political contexts in which their subject is embedded. At times, fully seeing an unfamiliar subject might require the zoologist to step outside the lab and get to know their subject, or get to know those who best know their subject.

3.2.7 As an act of loving ignorance

The final way that a high state of interest toward relationality might influence how knowledge is created in zoology is in supporting the creation of virtuous ignorance. This seems rather counter-intuitive as ignorance is often seen as opposite to the epistemic goals of science. I agree, but I also offer that some ignorance may help open up new paths to

knowledge. Loving ignorance occurs when a knower uses love, care, and respect to recognize that they simply cannot know some things. This is an interesting sort of ignorance because it describes a state of not knowing that can be helpful and valuable.

Some approaches to dolphin communication and linguistics helps to demonstrate how the creation of loving ignorance may offer additional epistemic benefits. Justin Gregg studies echolocation and communication in dolphins. His approach to his research on dolphin communication is relational in that it frames dolphins as interesting individuals with their own unique experiences (i.e., recall Keller's view); he is attentive to the experience of the dolphin outside of the research setting. In a recent podcast, Gregg described his view of communication in dolphins:

There's a new research group out there studying sperm whales ... They think if you throw enough data into an AI, it will be able to yank out language-like stuff. I personally do not think that's the case because I don't think sperm whales or dolphins need language to still be very smart, complicated animals. I just think we really want them to have language. (Justin Gregg in Ward, 2023)

Gregg's view here is based on the idea that some needs in dolphins are entirely unique from needs in humans.

By helping orient us to areas that we may never know about, loving ignorance may actually help to uncover new questions and create other sorts of knowledge. Here, Gregg implicitly relies on loving ignorance by noticing that the specific experiences and related communicative needs of dolphins are unknowable to humans. By seeing dolphins as they are, Gregg is comfortable with setting aside a question that has long plagued animal communications research: Do complex communication systems in non-human animals function like language in humans?

This does two things. First, it reminds us that scientific knowledge about non-human animals is meant to inform humans, and the unknowability of some things is not harmful (it might even be a loving act). Second, Gregg's openness to this ignorance helps to re-orient what communication actually is. Rather than seeing dolphin communication as some equivalent to human language, complete with a code to crack, the view presented by Gregg lets zoologists consider what is really needed to be a communicative, smart, complicated animal. In the case of dolphins, it might not be language. And far from blocking the creation of knowledge, this acceptance of loving ignorance might open up new questions about the nature of being a dolphin.

3.3 Conclusion: Toward the interested investigator

In this chapter, I have analyzed the influence a high state of interest toward the zoological research relationship might have on the creation of seven types of ignorance in zoology. Zoologists are active participants in their research and the commitments they make to their relationships with research subjects can influence how they create knowledge.

Zoologists who have a high state of interest toward their zoological research relationships are primarily able to navigate ignorance and create new knowledge in four ways: 1) by seeing their relationships as meaningful (via Code, 1987); 2) by seeing relationships as foundational for all, even their study subjects (via Code, 1987); 3) by seeing their study subjects as capable agents (via Keller, 1997); and 4) by motivating themselves to challenge the implicit assumptions they make about their science (via Nedelsky, 1989). I have used this analysis to both apply relational theory to understand the creation of ignorance in zoology and to extend how relational theory might be used overall.

In Chapter 1, I identified a gap in how relational theory has been used in the philosophy of biology. And in Chapter 2, I outlined one way that relationality can shape the different research approaches used in zoology. I used the idea of a researcher's "state of interest" in my analysis in Chapter 3 to start to fill this gap in the relationality literature. Overall, I demonstrated that the relationship between a researcher and their study subject is indeed epistemically important to at least some sorts of biological research.

As with any research, however, there seem to be more questions remaining than could be addressed here. Another of my aims in this thesis has been to demonstrate that affective values are not always harmful to the creation of scientific knowledge. By not shying away from feelings of love, care, and meaningful interest toward study subjects, ignorance may actually be avoided and knowledge created. This will have obvious implications beyond the epistemic dimensions of scientific research. As established in Chapter 1, the ethical dimensions of scientific work involving animals is important to consider. It would be

interesting to see whether the work presented in this thesis has implications for how ethical approaches to animal science are constructed, understood, or argued for. My work on understanding non-human animals as knowers will have direct bearing on any such further work.

Having already engaged with feminist philosophical accounts throughout this thesis, I am left with questions about the gendered dimensions of the work I discussed throughout. Many of my core case studies of early high state of interest approaches were practiced by women, and I know of many more cases where scientists who took on such approaches were affected by feminist concerns. Future work would especially do well to consider how oppressive power dynamics may have influenced the formation of such research approaches, and whether they continue to influence how high interest approaches are practiced in science.

Similarly, some of the epistemic implications of relationality as I presented them here engage with social epistemological concepts. Because of this, it would be important to examine more closely how researchers with a high state of interest toward relationality influence their own epistemic communities. I discussed it briefly by examining how relationally-minded zoologists might be motivated to take different human knowers seriously or might become (or appear) more trustworthy to other human knowers. This topic deserves more attention. Interestingly, I think that loving ignorance may play an important role in such research because it can allow us to accept that some knowledge cannot be claimed. Creating knowledge is a joined endeavour and is not only up to one human knower; sometimes you need a shark, an octopus, a chimpanzee, or raven to walk with you.

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