in the direct environment in which the visual observation is occurring. This process reveals 'the fact that knowing does not come from standing at a distance and representing, but rather from a direct material engagement with the world'.[15] This direct material engagement is the result of a particular process.

In conclusion, these situated mediations 'structure [and frame] the context of action'[16] during observation, making scientific insight possible. The binoculars, notebook and pencil, and video recordings thus become extensions of the biologists' bodies which allow them to translate their study object into visual inscriptions. While the data on the birds become richer to the biologists with each visual inscription, the inscriptions allow for categorisation and classification into a bigger, overarching system: a taxonomy. Simultaneously, the visualisations themselves are formalised conceptualisations that simplify information. The birds – with their emotions, thoughts, social relations, and being – are reduced to statistics, data, and charts. However, without this reductionism, no scientific insights would be possible, as the *un*translated research object is too complex for quantitative data analysis. Without these mediations, from the biologists' perspective, data collection would not be possible, nor the production of new scientific knowledge. Finally, situated mediations are a prerequisite for scientific fieldwork, as in my case study.

5.3. Sensory Alignment

Data collection in the field depends on multiple sensory alignments between humans, birds, and environments. Thus far I have mainly focused on the visual observations

15
Barad, *Meeting the Universe Halfway,* 49.
16
Grasseni, 'Skilled Visions: Toward an Ecology of Visual Inscriptions', 32.

and alignment of the biologist's gaze with the constantly moving birds. Alignment, however, also refers to the other senses involved in data-collection practices and fieldwork.

To understand how sensory alignment is employed by the biologists during fieldwork, I refer to Rane Willerslev's[17] work on 'mimetic empathy' by assuming a 'double perspective', which he developed based on his ethnography of Yukaghir hunters, thus working in a similar geographical location and environment to the biologists and me, albeit with a different epistemological focus. While he describes these concepts as techniques for hunting, I apply them to the biologists' attraction of the birds. Although scientific observation has nothing to do with hunting, the sensory practices that both hunters and biologists engage with prior to the killing – or in my case, observations – are similar. In both cases, they must attract the animals using the least invasive practices in their habitat where they, the animals, are the experts and the humans inferior.[18]

Mimetic empathy, as Willerslev describes, '[...] is the ability to put oneself imaginatively in the place of another, reproducing in one's own imagination the form of the Other's perspective'.[19] The biologists, who I do not aim to portray as hunters here, perform similar practices to the Yukaghir hunters in attracting the birds. This means that it is essential to adopt the perspective of the birds. However, the extent to which this perspective should be adopted has its boundaries; the aim should not be to adopt the birds' perspective in an absolute sense, according to Willerslev, who describes hunting as an Indigenous tradition that follows

17
Willerslev, 'Not Animal, Not Not-Animal'.

18
With this, I am not implying that the observations and experimental settings that the biologists create in the forests do not affect the birds or their results; instead, I use the term to distinguish it from laboratory conditions in which the research objects are isolated from their environment and the system in which they are usually situated. However, what does not seem to be reflected is the presence of the biologists when they observe and study the birds and how it may affect their measurements.

19
Willerslev, 'Not Animal, Not Not-Animal', 647.

a different sensory alignment to non-Indigenous relations to nature, particularly in Western thinking. Rather, the biologists must adopt a 'double perspective':

> [T]hey attempt to assume the point of view of the animal, while in some profound sense remain the same [human]. Mimetic practice, [...] provides the ability to be like, yet also different from, the animal impersonated; it grants the hunter a 'double-perspective' whereby he can assume the animal's point of view but still remain a human hunter who chases and kills the prey.[20]

For the biologists and their interests, this means that they attempt to think as the birds do in order to work with them; however, I would not assume that they attempt to impersonate them as Willerslev suggests for the hunters. They aim at technically and sensorially manipulating their environment, including themselves, in such a way that they can observe the birds. For this, they create their observational settings, which are designed so that the birds can display their usual cooperative behaviour, even though it is an artificial setting. With reference to anthropologist Michael Taussig's concept of mimesis, this sensory alignment by means of mimetic empathy, '[...] collapses such dichotomies as Self vs Other, nature vs culture, and essentialism vs constructionism'.[21] By doing so, the biologists create a multispecies *we* during fieldwork, a sensory entanglement between the birds and themselves, that shape one another, which Barad refers to as intra-active becoming.

These two concepts – mimetic empathy and double perspective – permit analysis of the different sensory alignments of the biologists with the birds during fieldwork. Other than for Willerslev's hunter, the sensory alignment of the biologists mainly occurs by means of visual, tactile, and auditory perception. Highlighting the role of sensory

20
Ibid., 630.
21
Michael Taussig, *Mimesis and Alterity: A Particular History of the Senses* (New York: Routledge, 1993), 252 as cited in Willerslev, 'Not Animal, Not Not-Animal', 639.

alignment during biological fieldwork will also help to shift the perspective of scientific knowledge production from one that is only based on objectifying the animal *Other* to one based on engaging with their *personalities,* if you will, a prerequisite for conducting fieldwork in the first place that should be conceptualised as such: the cooperative behaviour of the Siberian jays in their family groups. These personalities become visible in their interactions and when Michael would informally categorise them and comment on the individual birds' behaviours as well as that of the groups.

Attracting Birds

As described in the previous chapters, the biologists find the birds in their natural habitat. They immerse themselves in the biological world of the boreal forests. This immersion only works through sensory alignment. First, to navigate through the forests in the best way and arrive at the bird territories, the biologists need to understand the environment in which they work from the birds' perspective.

Second, as the birds in this study are not usually equipped with any radio tags that would allow the biologists to track them, they must follow them in other ways. Accordingly, the alignment in this case starts with attempting to understand the way the birds inhabit the forest; the routes they fly, the parts they avoid, what makes them feel comfortable, and finally, which territories they choose. The biologists must learn to empathise with the birds; when looking for their territories, they must think like birds, particularly when deciding where to put up the feeder, so that the birds feel comfortable.

This alignment becomes particularly visible when attracting the birds. Once the biologists arrive in their habitat, they attune themselves to the birds auditorily. They do this

mainly by imitating the birds' calls, in terms of melody, rhythm, and intervals. One could claim that the biologists attempt to sound like them. Skilled biologists such as Michael imitate an entire partiture, mimicking their sounds and offering them a range of calls. Michael, with his many years of experience listening to the birds, switches between the imitation of the birds' offspring, and other 'happy' calls, which he calls 'chit chat', avoiding whistling in a way that the birds may interpret as a warning call or that of a predator. This way of communicating with the birds is only possible through mimetic empathy, deep immersion, alignment with them, and an understanding of their calls, which can only be gained through experience and extensive training, particularly when it comes to imitation. The biologists also remain alert for the calls of predators – most often ravens – during data collection. They usually do not see predators because they are focused on the jays.

In these moments of auditory alignment, Michael appears to be exhibiting what Willerslev refers to as the double perspective. He imitates the calls with a rich pattern of Siberian jay sounds, while somehow moving through the territory in a light and animated manner, like the birds themselves. His experience appears to have reached a point where he adapts his bodily actions to the research, along with adopting the behaviour of the birds, thus, literally embodying the research and incorporating it in his bodily knowledge, beyond the imitation of calls and observational practice.

Through this mimicking performance, he appears to become the bird, while at the same time maintaining focus. As soon as he notices a bird, he adjusts his calls, for example, by waiting for the bird's response, but also by grabbing his binoculars. He looks through them with the clear intention to identify his research subject by examining its IDs. He does this while continuing to call for the birds. In these

moments, he performs Willerslev's double perspective: transcending the boundary between human and non-human through auditory and partly physical alignment with the birds; simultaneously performing and manifesting difference based on his visual observation as biologist, in which the birds are still a source of data.

Calling for the birds also involves knowing when to start and at what point it is necessary to feed them sausage to make them stay. This requires an alignment or empathy, not only as an auditory experience but also as the ability to understand the jays' thinking to a certain extent. This kind of understanding led Michael and other biologists to the conclusion that jays are easy to study because they are relatively tame and curious birds that are easy to attract.

In Michael's case, he may 'transcend inter-species barriers with the aid of [his] embodied imagination [...]'[22] in the moment of attracting the birds. However, this is not the case with all the biologists I have accompanied, and it appears to be a question of experience, practice, and extensive immersion in the field. Nonetheless, younger and less experienced biologists without this 'doubleness', such as Julia, Marine, Camille, and Kate, were able to successfully conduct fieldwork, occasionally even through arbitrary whistling that did not have much to do with the birds' calls. As Michael told the group, it is not so much about imitating the calls but rather revealing their human presence. Based on my other interlocutors' comments, I would still claim that Michael's success in attracting the birds, and his efficiency and speed in fieldwork, is based on this mimetic empathy and double perspective.

Thus, in varying degrees, the biologists '[...] project themselves, through practices of mimetic empathy into the life-world of [the birds]. Practices of mimetic empathy provide the entrée, so to speak, to the perspective of the animal'.[23]

22
Willerslev, 'Not Animal, Not Not-Animal', 648.
23
Ibid.

Lastly, sensory alignment is not a formalised scientific practice, but a mindset that accompanies the research, and – in both cases – the biologists may return home with data. The practices they employ still differ, and the ontological boundaries in which they are situated during fieldwork shift and overlap, depending on the degree of mimetic empathy and double perspective.

Sensory Alignment and Registering Birds

This intra-relational and intra-species 'becoming with another',[24] as it becomes particularly visible in the moments of sensory alignment, is ruptured when registering the birds. Then, instead of aligning with the birds by making them offerings that they can deliberately accept or reject, the biologists impose their will onto them, by aligning with them not as an offer but a trap (cf. Chapter 4: 4.3.2). They literally install a trap that the birds will fly into, briefly falling prey to the manufactured structures in their life-world. In this moment, the power that this mimicking affords the biologists becomes visible.

This sensory and emotional alignment enables the biologists to understand how the birds fly through the forest and how they think, which informs them about how to set up the net and catch the birds. And while, on the one hand, the biologists are fascinated by the intelligence of the birds and their personalities, such as being 'shy' or 'friendly', on the other hand, if the birds' intelligence helps them avoid the nets, they become frustrated. They then encourage the birds by shouting 'Come on!', or if a bird is close to the net, 'Now, now, now!', and if they do not fly into the trap, a frustrated 'Noooo...' follows. These verbal encouragements have now become a combination of human language and

24
Barad and Haraway both argue that scientific worldmaking is always the result of a process of 'becoming with' another. By referring to philosopher of science, Vinciane Despret in *Staying with the Trouble: Making Kin in the Chthulucene,* Haraway describes the 'becoming with' between birds and ornithologists as multispecies worldmaking (127–29).

animal calls, along with the practice of throwing supermarket sausage into the air towards the nets, thus overlapping several lifeworlds.

Once they are successful and a bird has flown into the net, a new phase in the sensory alignment with the Siberian jays begins. Now, a dexterous hand is necessary to free and register them. This requires general tactile skills and knowing specifically how to handle the birds, a kind of embodied knowledge that cannot be taught in universities; the actual handling of the birds can only be learnt through situated (sensory) enskillment in the field.

Barad describes the moment '[w]hen two hands touch [as one in which] there is a sensuality of the flesh, an exchange of warmth, a feeling of pressure, of presence, a proximity of otherness that brings the other nearly as close as oneself'.[25] Handling birds is thus an intimate, sensory experience unique with each bird. Indeed, the moment the biologists' hands wrap around the small bodies of the jays, there is a closeness that can rarely be encountered between *wild* birds and humans. In this moment, the natural world and the human world collide; generally, for humans, birds are unattainable creatures, out of reach; and, perhaps for this reason, they evoke significant fascination among ornithologists.[26]

However, while the birds have become the biologists' *prey* during the process of registration, the biologists also have power over the birds, independently of their intentions to turn them into prey or not. I suggest that the biologists are conscious of this and aware of their relationship to the birds. For this reason, these moments of catching and registering the birds create the most stress for them

25
Karen Barad, 'Diffracting Diffraction: Cutting Together-Apart', *Parallax* 20, no. 3 (2014): 153, https://doi.org/10.1080/13534645.2014.927623.

26
At this point, I would like to note that Michael and his team do not consider themselves ornithologists who only study birds. They consider themselves evolutionary biologists who work within Darwinian and evolution theory, attempting to understand how systems evolve and adapt to the environment (cf. field notebook entry, field season 2020, Day 6, during the drive back with Michael to pick up Marine and Camille).

during fieldwork. Their aim is not to harm the birds, nor to kill them or turn them into prey; instead, they want the birds to remain intact so that they become a valuable data source for their research.

While the biologists interact with the birds, they work hard to meet them at eye level. Holding them in their hands, they lift them up in front of their eyes, and the birds, with their deep black eyes, almost appear to be looking back. The biologists stroke their feathers and feed them sausage as a way of aligning with them instead of intimidating them. In this instance, they can feel how relaxed or stressed the birds are: some continue attempting to open their wings, whereas others try to defend themselves by pecking the biologists with their beaks, and some sit calmly in the biologists' hands with little resistance.

As much as the biologists attempt to treat the birds with respect by talking to them in a friendly manner while handling them and imposing the human world onto them, the boundaries of alignment between birds and biologists, human and non-human, become apparent. The catching of the birds is an ontologically violent act, as much as the biologists may defend it. It creates a duality in their sensory alignment: On the one hand, they attempt to empathise with the birds, while on the other, they must catch and register them to conduct their research and produce knowledge that will circulate between other humans. However, this knowledge may result in a higher awareness of the natural world and its systemic entanglements, and, thus, if mediated successfully, promotes its protection. The birds twitter and attempt to free themselves as they are being ringed, but the biologists do not respond. They hold onto them and continue their routine of measuring and collecting data from them.

It is clear in that moment that they are no longer response-able. This scenario is not a meeting between two subjects; instead, the birds have been turned into objects, thus

establishing a subject–object divide anew. The birds cannot react according to their instincts, as they have been removed from their lifeworld and reterritorialised in the biologists' lifeworld, the research setting in which they are subjected to the biologists' will. Once the birds' weight, size, tail length, blood samples, and tail feather for DNA sequencing have been obtained, and the rings attached to their legs, they have literally become research *objects*. Henceforth, they will lead dual lives as research objects that provide the biologists with data, and subjects that continue their lives in the forest.

Sensory Alignment as Situated Practice

The biologists first undergo sensory enskillment in the field (Chapter 4). I referred to this as situated enskillment, based on Haraway's situated knowledges, to emphasise that this enskillment is highly dependent on the actual location, discourse, and thought style, and it is thus anything but a universal enskillment that applies to all situations. Sensory perception is always embodied and relates to a location: 'As such, perception is not an "inside the head" operation, performed upon the raw material of sensation, but takes place in circuits that cross-cut the boundaries between brain, body and world'.[27] As Willerslev states: 'Mimetic empathy, [...] does not imply therefore simply representation or imagination, but has a decisively corporal, physical, and tangible quality from which the former ultimately emerges and from which it derives its "material"'.[28] From this perspective, sensory alignment is a situated process that is embodied, cognitive, and in situ: in the field and in the biologists' bodies.

27
Ingold, *The Perception of the Environment: Essays on Livelihood, Dwelling and Skill*, 244.
28
Willerslev, 'Not Animal, Not Not-Animal', 648.

Sensory alignment with others, or other species, '[...] to a certain extent means that we "become" another kind "with" that being'[29] and 'becoming with is a practice of becoming worldly'.[30] I understand sensory alignment as a practice of 'becoming with', which leads to 'becoming worldly' and 'earthbound' (Latour). Therefore, I understand the notion of 'becoming worldly' as a version of situatedness that contrasts with Haraway's 'god's view', which would instead be something *heavenly*,[31] taking in a 'view from above'. Being *earthbound* suggests an opposition to the metaphysical notion of *heavenly* sciences, performed by a neutral scientist who is detached and does not become involved with the research object. With this, I consider the biologists 'earthlings' and thus entangled with their research subjects rather than detached from them. I argue that this entanglement becomes especially visible during sensory alignment.

Scientific work, as it is practised in my case study, and more generally, is always the result of a situated, partial perspective. However, this situated perspective cannot be considered independently of other relations that unfold in situ. Sensory alignment, as a combination of sensory skill, embodiment, and implicit knowledge, also contributes to this situatedness. Lastly, fieldwork occurs in the field, and as I have illustrated, is only possible through physical and sensory immersion. It is a practice that is literally situated – in this case, in the boreal forests of Arvidsjaur in northern Sweden – and is eventually part of situated mediations.

29
See Haraway, *When Species Meet,* 4, 16–17, as cited in Eduardo Kohn, *How Forests Think: Toward an Anthropology Beyond the Human* (Los Angeles: University of California Press, 2013), 140.

30
Haraway, *When Species Meet,* 3.

31
If one follows the metaphor of the (patriarchal) god view, which Haraway suggests describes objectivity, as it has been performed by the scientists thus far.