5.2. Observing

Michael has just finished setting up in *Angel* when the birds move agitatedly around the feeder, approximately 10 m in front of us. While looking at the birds, I see the hill we just ascended to reach the territory. The trees, mostly pine and birch, but also some bushes covered in snow, have grown in a straight line towards the sky, forming a narrow angle between the steep hill and their trunks.

Angel is located at the edge of the study area of *Reivo* in the northeast. Its name suggests that we may encounter an angel-like Sámi man here, as biologist Barbara, together with Julian, did in 2014 when they conducted their fieldwork in Arvidsjaur for the first time and discovered the group on this territory. While Michael observes the birds, talking partly to himself and partly to the birds, I continue quietly observing the scenario. The birds are moving around on a lower branch surrounded by trees. A surprisingly large number of birds have appeared in this territory, and Michael must concentrate on distinguishing between them and documenting their interactions. His gaze shifts between the birds and his notebook in his right hand, the pencil in his left, and the binoculars, which are either in both hands in front of his eyes or dangling in front of his chest.

For the next 15 minutes, all Michael's attention is dedicated to the events unfolding around the feeder. With his full attention on the behaviour of birds, once he decides that a certain behaviour is relevant to the research, he documents it almost immediately with a code in the observation protocol. He only needs to look away from the birds very briefly at the notebook to ensure he writes the code that represents a specific behaviour in the correct box. During this process, he switches between the binoculars and his bare eyes to track as many birds as possible. He uses his macular vision, which is extended by binoculars, to look

at the events and bait, and his peripheral vision to track what the other birds are doing. In this way, he remains alert to the various events until he writes down the next code in his field notebook, thus adding to the behavioural observation protocol. His dexterity and the speed with which he makes notes and observations remind me of the birds' movements, and I believe his rhythm of looking up and down may, in some ways, align with the rhythm of the birds' feeding.

Occasionally, Michael's gaze moves away from the feeder and follows the birds through the forest. I follow his gaze to see what he is looking at. Looking at the sky, I see bright blue; looking down, everything turns white; and looking around horizontally, everything turns into a dark green and brownish grey. The closer the objects are to me, the more details I can study, whereas the further away they are, the more I must guess. Nevertheless, I hardly ever use binoculars because they make me drowsy. I see pine needles scattered across the ground, branches and lichen that the wind has blown off, and some pinecones that a squirrel may have brought along. Occasionally, the snow tells the story of some mice that have crossed it since the last snowfall, while at other times, I see bigger tracks that I cannot identify. Gigantic, almost 1 m deep prints indicate that moose have come past. Besides the sound of Michael moving around and the calls of the birds, there is little else to hear. I take photographs of these details, which I often decide to delete again. I make notes in my field notebook to remember this situation, and I stop and observe, attempting not to distract myself too much by the tools I brought along.

Extending the imaginary line introduced earlier beyond where the birds are feeding, it leads above the hill into the cold, blue horizon in front of us. At its other end, it crosses a white, open field and enters the forest again. This open field is now behind me. It is covered in snow touched by

gentle sunlight, which creates bright reflections on its calm surface. The forest line, consisting of dark green, almost black and grey colours, surrounds this bright white, open field. Soon we will cross it, following the imaginary line to enter the forest at its far end on our way to the next territory. We will continue this route by drawing a diagonal line in the fresh snow with our skis. We will connect our entry point into the open field with our exit point when we disappear into the forest. The line is a trace of our presence, connecting each territory until, in a few days, we will have returned to the study area several times; at that point, the multitude of lines makes identifying individual ones difficult.

While I make these observations during fieldwork, Michael, conversely, observes something entirely different. He observes one frame of the scene in great detail, which I observe from a distance. For now, he is not interested in the environment if it does not affect the birds' behaviour. He is focused on the birds, identifying their colour IDs and observing their behaviour. He knows that the weather today is good, but he does not study it – not the blue sky nor the shape of the clouds. Michael's tools for data collection and his mindset prevent him from becoming distracted and help him filter and document the relevant aspects and disregard the irrelevant.

Michael knows that to progress with his research, his data must be valuable, which means documenting the birds' behaviour as accurately as possible. He needs to turn the birds, his subjects, into data that can be transported through space and time, from Sweden to Switzerland, from here and now to there and then. His subjects, thus, become space–time entities that transcend their temporality and situatedness. Similarly, he aims to obtain an overview and sense of the birds, and to record their interactions, producing a behavioural observation protocol so that he can take them home as inscriptions, which is my aim as well.

My notes, photographs, and audio recordings are also data that I collect in the field to turn the biologists' work into inscriptions at home. However, our methods differ, as a natural scientist and an ethnographer operate in different spheres of epistemologies.

Behavioural Observation Protocol

The outcomes of the observations are usually field notebook entries with a behavioural observation protocol and video recording of the same event. For this, the biologists adhere to six different behavioural patterns relevant to their study on the social behaviour of kin and non-kin birds; they observe these and collect data on the birds' interactions around the feeder. The protocol is designed so that interactions are not recorded along a timeline, apart from the video recording. However, the data collected consist of a quantitative summary of the interactions during this 15-minute period, thus filtering out certain events the biologists focus on.

When studying the protocol that resulted from these observations, the biologists can identify the patterns demonstrated by the birds in the territory. In my research material folder, I open a PDF file with the protocol used in 2016 in *Impossible,* when I was not present in the field. I attempt to retrace the interactions observed by the biologist (Figure 47). When reading the protocol from left to right, the first code I find is the number '2', which indicates that the bird with the ID 'mb al mg mg'[3] displaced the bird with the ID 'mb al mg pi'. This means that while ID 'mb al mg pi' (as the biologist would call the birds during the observation) was feeding from the fat, the actor (as the biologists call the bird that was displaying a certain behaviour) landed where

3
The code represents abbreviations of the names of the relevant colours in Swedish, e.g., 'mb' stands for the Swedish *marinblå,* which means navy blue; 'al' means aluminium, which is the same in both languages, and 'mg' is *maringrön* or dark green.

the recipient (the bird that receives an action) was and thereby forced them to leave. I learnt that this is usually a behaviour that can be observed between non-kin birds. And, indeed, when comparing the IDs with the Excel list I have at hand, I see that the bird that chased away the other bird was the breeding male in this territory.

In the next column, I read '1111', indicating that the same bird that was chased away earlier had been waiting to feed less than 1 m from the feeder – denoted by the code '1'. At the same time, another bird, identified as 'li # o al', the offspring of the breeding couple and thus a 'kin' bird, was feeding. During the 15 minutes of observation, this event occurred four times. One box to the right, notes '0100', indicating an interaction between the bird that thus far has not been able to feed at all and the breeding female bird, ID 'gu al r #'. The bird joined the female while she was eating, and the female accepted this, as indicated by the '0', which means 'feeding together'. These two birds ate together three times during the 15 minutes of observation, and once, as indicated by the '1', the other bird was waiting nearby.

As this same bird was also displaced from the feeder three times by the offspring of the breeders, I conclude that it must be a non-kin bird – born in a different territory and chased away by its siblings. It appears to have later joined this family, creating what the biologists would describe as a 'typical' family dynamic involving both kin and non-kin relations. One final type of behaviour was observed in *Impossible,* indicated by the '3' in the bottom right. This code means that the breeding female was physically chased away by ID 'lg li al r' – either through bill snapping or being pursued in flight – after first being displaced by the same bird.

The chart allows the biologists to draw initial conclusions about the birds' hierarchical family structures. These will later be confirmed or dismissed by a DNA analysis and the video recording of the event. However, as the analysis may

take place over several months, the preliminary observations allow for an initial conclusion. This is important as, depending on this, the biologists will select certain bird groups with which to conduct further experiments during their field season. A *good* group for experiments is, for example, one with high family activity, with many kin and non-kin birds in the group and diverse relationships.

The experiments follow the same procedure as the basic behavioural observation protocols. They usually identify whether a hypothesis – an assumed explanation for the relationship between behaviour and reason – has been formulated correctly. Accordingly, many experiments enhance situations that the birds encounter in their environment by creating artificial settings. In this way, the biologists both provoke the birds' reactions through the experiments – enabling observation and documentation – and use these experiments to identify the underlying factors that produce such behaviours.

During experiments the biologists usually manipulate physical aspects; in this case, the birds' environment. This starts by providing them with food that otherwise would not be available to them. Often, but never when I joined the study, the birds are exposed to settings where they are either confronted by a dummy of a predator or the predator's calls. Alternatively, to study how the birds learn from one another, in 2015 the biologists exposed the birds to a self-built feeding box (Figure 48) and recorded their behaviour with videos and notes. Regardless of the events observed, the biologists consistently use behavioural observation protocols to record the birds' behaviours.

The process of video recording is a combination of observing the birds visually, while making behavioural observation protocols, which they supplement with an audio recording. They verbally describe all interactions based on the codified categories, along with everything else they can observe, particularly aspects that occur outside the video

frame. Thus, the events they audio record are not arbitrary but highly selective, corresponding to the codes defined in the behavioural observation protocols.

The biologists start the video recordings by stating the date, time, and territory, and naming the birds they have seen. Some add their name so that other biologists who might analyse the recordings can return or at least know who made the video. This is followed by which bird is on the feeder and in which position. Saying all four colours of the birds' IDs takes too long, particularly if events are occurring rapidly. Thus, most biologists, once they have identified the birds, continue referring to them by their most prominent ring colour, along with their sex or family relation. This results in names such as 'orange female' or 'breeding female' rather than 'light blue, orange, metal, pink' for the video recording. Before the biologists finish their observations in the field, they often make some final notes in their notebooks, disassemble the camera, and store everything in their bags.

While the biologists solely used the video recording to record the birds and thus collect data, the behavioural observation protocol is also a significant tool for training the biologists' observational skills. Employing the protocol can be a complex task involving identifying birds, noting behaviours, and documenting observations. Thus, the biologists develop their visual attention and train their eyes within this framed event. It is a tool that allows for a quick overview of the different behaviours within the individual families and to learn, understand, and interpret these behaviours. However, for this, the biologists need to learn to translate between the behaviour and the relevant code, and the birds and their IDs, to make sure they document their observations correctly.

Once Michael has finished his behavioural observation protocol, before leaving the territory, he makes sure that the feeder is attached securely to the tree and that it is 'raven

proof', which means that ravens cannot attack the jays too easily when feeding from it, and that the ravens cannot simply steal the feeder. Subsequently, he and the other biologists move from one territory to the next, following the same routine to attract the birds, waiting until all are present, and then conducting their observations, while I follow them on my skis through the tracks they have created in the deep layer of soft snow. At times I can see them, while at other times I merely follow their tracks. When I hear them calling for the birds, I know that they have arrived and that the next territory is close.

From Bird to Data

This moment of documenting and codifying behaviour is a crucial turning point for the animals' transformation from birds to data. Only by documenting a specific activity, performed by the birds and observed by the biologists, does this activity become data. Before this, it is an ephemeral event entangled with many others that must first undergo the selection process by the biologists, who decide whether the observed behaviour is valid for the research. Once the behaviour has been captured as data, the birds are turned into a code and a datum for the overall dataset. At that point they have been 'tamed' from wild birds to scientific objects. Now the birds themselves as living creatures in the forest only continue existing in the memories of the biologists as testimonies of the observations they made. The more the biologists physically distance themselves from the field, the more the birds disappear from the study as *birds* for the sake of their inscriptions as codes and numbers. These small codes in the field notebooks are the starting point of an entire body of scientific analysis that unfolds based on this documentation and the biologists' decisions to note them down.

The research objects of the biological case study, the Siberian jays, are thus turned into inscriptions that represent a specific aspect of their behaviour, namely one brief sequence of interactions during feeding, which will later be interpreted by the biologist as the social behaviour among the group. All other actors, such as other animals or bird species, possible predators, the few people that may be encountered in the forest, as well as changes in the landscape and problems faced during the observations, are partly noted down as side-notes but mostly they are ignored. The side-notes serve two main purposes: First, to contextualise the observational setting, which helps the biologists to remember the field situation; and second, as metadata, particularly on predators and settings. The biologists will return to these notes if something unexpected appears during data analysis.

These side-notes usually do not become data but contribute to an overarching framework of knowing, understanding, and interpreting the field. The notebooks' capacity to record side events draws the biologists' attention to these moments. In doing so, the notebooks exert a form of agency that shapes observational methods, contributes to the field experience, and highlights aspects of research that go beyond quantitative data – revealing the extraordinary within the everyday.

Modes of Observation

From an ecofeminist perspective, behavioural observation studies are part of an apparatus of knowledge production. This apparatus is shaped by the relevant discourse, epistemologies, and ontologies. As Barad establishes, 'There is something fundamental about the nature of measurement interactions such that, given a particular measuring apparatus, certain properties become determinate, while others

are specifically excluded'.[4] Accordingly, what is decisive about this apparatus is that it not only attends to specific properties but also helps to constitute them – particularly in the case of the birds' behaviour. These aspects can only be rendered as data through processes of selection, which necessarily involve the exclusion of others. Barad continues: '[w]hich properties become determinate is not governed by the desires or will of the experimenter but rather by the specificity of the experimental apparatus'.[5] What follows is that (only) based on the properties of the apparatus are the biologists able to collect their data. In doing so, they become as much a part of the apparatus as the discourse that has led to the definition of methods and research questions, thus shaping the requirements for the apparatus.

Thus, the apparatus in my case study involves the way Michael extends his vision with the binoculars. It is determined by his vision, which is framed by the behavioural observation protocol, which is again informed by the behaviours of the birds that will be documented. At the same time, the protocol determines how the behaviours of the birds are defined. Therefore, the behavioural observation protocol is more than just methods, hypotheses, biologists, and research *objects*. These are part of an apparatus in which the biologists, based on their bodily practices (of looking) and epistemological practices (of knowing what to attend to), intra-actively co-constitute one another together with the birds. In these settings '[…] neither the subjects nor the objects of knowledge practices can be taken for granted, and […] one must inquire into the material specificities of the apparatuses that help constitute objects and subjects'.[6] To conclude Barad's argument, the birds, biologists, and experimental apparatus are inseparable, and changing one

4
Barad, *Meeting the Universe Halfway*, 19.
5
Ibid.
6
Ibid., 27.

aspect in one entity influences the entire process of knowledge production. During data collection, material-bodily practices and cognitive-epistemological practices are no longer separable. The biologists, jays, technologies of observation, and discourse together form an apparatus, and the resulting inscriptions of raw data are the phenomena created by this intra-active process. Ontologies and epistemologies of the apparatus thus become entangled into onto-epistemologies (Barad).

Against this background, I analyse the properties of the 'apparatuses of visual production'[7] that shape data collection in my case study. With regard to the behavioural observations, I suggest that three modes of material–semiotic vision can be identified, '[...] including the prosthetic technologies interfaced with [the biologists'] biological eyes and brains'.[8] First is the biologists' natural, or rather bare, vision based on their human eyesight, shaped and formed by their formal biological knowledge and their situated knowledge within this study. This vision is informed by the ongoing scientific discourse and the result of situated enskillment of the study. Second, the biologists' observations are, as skilled mediations, shaped by technologies of vision that '[...] function as catalysts of our attention and action [...]'.[9] In these skilled mediations, material practices and technical skill (of handling, e.g., the binoculars and behavioural observation protocol) are combined with visual skill. Together, they form the epistemological practices of observing, categorising, and documenting the birds' behaviour. Third, in terms of the video recording, the visual task of observing is delegated to an automated device.

These three ways of studying visible events result in three kinds of vision: framing, filtering, and, eventually, data. They result in different intra-actions between the biolo-

7
Haraway, 'Situated Knowledges', 589.
8
Ibid.
9
Grasseni and Gieser, 'Introduction: Skilled Mediations', 13.

gists and technologies, different ways of storing data, and different bodily practices. While bare vision is limited by its embodied frame, natural focusing, and the inability to zoom or record, tools like the video camera and binoculars extend these capacities, enabling the biologists to see in new ways. However, the case of the biologists shows that only in their combination is data collection, as it is done here, possible. Thus, all aspects are part of the apparatus of observation.

Bare vision is not extended by any tools or media. It is, however, a mediated form of perception, shaped by the human body, biological limitations, and the visual apparatus itself. While it is the same visual tool the birds employ, they *see* differently in different colours, contrasts, shapes, and dimensions. It helps guide us through the territory and see risks before it is too late, and it allows us to keep track of what we want to follow on our skis. The biologists and I also use our bare vision to study notes, maps, charts, and data, and to take notes and fill in the behavioural observation protocols. The difference manifests itself in *what* we see in those materials as a result of our (epistemological) situatedness. Even observing and identifying the birds with the naked eye – and distinguishing certain behavioural patterns from others – requires professional training, initiation, and knowledge. It is, in this sense, the biologists' and my *natural* vision. However, it should not be *naturalised* because, returning to Haraway, it is a situated practice, a partial perspective, and a view from somewhere. It is not objective, but always part of an apparatus, and the result of training, schooling, and skill, and thus never *neutral.*

What can be observed is not arbitrary but determined by visual skill and situated enculturation. When the biologists arrive at the bird territories, they begin by scanning the environment, visually and auditorily. They study the trees and the surrounding landscape, looking and listening for birds. While I focus on the biologists, at times imitating

them by also looking up – albeit with less motivation to see birds – I want to recreate their gaze to understand their methods of observation. However, whenever I attempt this, I notice a boundary where my observations stop. I often struggle to actually observe the birds, and I cannot interpret what I see from a biological perspective, or I do not even know what to focus on. Accordingly, in this field situation, despite being in the same place and exposed to the same events and practices, whether it is the biologists' visual attention or mine, we make entirely different observations, as we come from different ecologies of practice and are part of different apparatuses of observation.

While much can be observed with the bare eye, once it comes to formalised data collection and specific observational practices, its limits may be reached. The naked eye can no longer do what is required by the biologists to turn the birds into data. Bare vision is distracted too easily. It does not provide sufficient focus for the biologists' observations, and it lacks the capacity to store information. In addition, there are differently trained and enskilled eyes involved in fieldwork. To compensate for this difference and create consistency, the biologists' visual skills must be aided by technology. They must become mediated, not only by the discourse but also, in its most literal sense, by tools and media. To collect data consistently, bare vision must be extended or complemented by binoculars and the behavioural observation protocol, which help guide and narrow the focus.

The binoculars frame the biologists' vision and enhance their natural visual capacity. The main feature of binoculars is their capacity to bring things closer. This allows the biologists to overcome visual distance that would otherwise not be possible. Binoculars help the biologists to look more deeply into the forest and higher up into the trees. They can observe events on a larger scale and with richer detail than they would naturally be able to. The powerful

zooming effect makes the birds appear to be right in front of the observer, thus also affecting their scale and image. This is necessary to identify the individual birds and accurately study their interactions during the behavioural observation protocol.

However, binoculars create a blind spot, a visual gap between the biologists and the birds, and thus, significantly tunnel their visual attention by excluding their immediate surroundings. In this sense, the binoculars help guide their attention by making the biologists blind to the complexity of their surroundings. However, the binoculars do not facilitate this as detached entities. They do not work separately from the biologists' bare vision but in intra-action with it. Thus, the observations are shaped by this combination of vision. In this sense, the gaze that is extended through the binoculars is the same gaze that is always also epistemologically and ontologically situated, as described earlier.

From this perspective, the binoculars must also be considered part of sensory enskillment because they require a different sensory attunement than the bare eye. Looking through binoculars must be learnt. Only once the biologists have mastered it, overcoming visual distance without physically changing their *standpoint,* have they been sensorily aligned to the capacities of their tools and are they able to *see.* Without experience, it is difficult to bring an object into focus when looking through binoculars, particularly if the object of study is as animated as the birds and moves as fast as they do. Therefore, looking through binoculars – besides the knowledge of what to look for – requires visual skill and training in the interaction between the body, eye, and tool.

Once these steps have been completed, an additional tool for tunnelling the observation can be added to the observational apparatus and the behavioural observation protocol. As described at the beginning of this chapter, the protocol determines the properties that become data by drawing

primarily on the observational chart, thereby including only these aspects and effectively excluding all others. Now, the biologists observe the birds with eyes (their extended vision by means of the binoculars), and hands (the notation practices of the protocol). These practices have become inseparable and co-constitutive, functioning as situated mediations that shape the observational entanglements between the birds, as research objects, and the biologists.

The last mode of vision that accompanies the observational apparatus in the field is the video recordings. They allow the biologists to zoom in, document, and store a large volume of detailed data on the birds' behaviour. The biologists can go back and forth during analysis once they have transported their data back to their offices, given that the recordings document the entire event and are an essential part of their raw data.

The videos follow a different logic of visual attention. The biologists set up the camera in advance and the camera steadily observes the events in front of it, despite technical glitches that may occur. This documenting process occurs independently once the record button has been pressed, until the biologists intervene. From then on, every detail is documented and stored on the SH chip of the camera; thus, it is like the behavioural observation protocol but everything that is outside the frame is filtered out. While the video camera does not differentiate between relevant and irrelevant aspects within the frame, it recreates a thick documentation of the event in a linear time frame. The behavioural observation protocol, in contrast, creates a quantitative extraction of only the relevant aspects, which simultaneously become visible, thus also filtering out the aspect of time.

In addition, the video camera detaches the bodies of the biologists from the observation once the documentation process has been set up (Figure 49). Thus, visual skill is not

relevant here, except in choosing the frame. However, the biologists compensate for the limitations of the camera by verbally explaining the observations, particularly those beyond the frame. They focus on naming the IDs of birds that are interacting and emphasising aspects that are relevant. These descriptions are not arbitrary, but, again, follow the logic of the behavioural observation protocol. The biologists' coded observations are subsequently verbalised and recorded as part of the audio layer. Only once these data have been transferred to computers, do the biologists return to their bare vision to analyse the recorded material in their offices, which I shall discuss in Chapter 6.

All modes of looking – the camera and the (extended) eyes of the biologists – simultaneously observe the birds. Together, these modes of observation follow a hierarchisation of visible events to determine what exactly is turned into data. As a form of multi-layered filtering, the combination of these methods allows the biologists to translate bird behaviour into quantitative datasets, which in turn form the basis for scientific analysis and results. They constitute the apparatus of observation. As a layering of visual practices, the observations become a visual description of the social interactions of the birds, which then forms the basis for further analysis and production of robust data.

The observational system is established in such a way that it allows the biologists to record, document, and store a thick description of their observations on transportable media – immutable mobiles – that they can transport from Sweden to their university offices for interpretation and analysis.[10] These visions add up to a metaphorical *seeing* in the sense that the biologists, depending on how they combine the data and results of visual practices, gain new knowledge and in*sights* within this apparatus of knowledge production. If successful, they can *see* something new in their resulting data, which will then lead to new publications.

10
Latour, 'Circulating Reference: Sampling the Soil in the Amazon Forest'.

Situated Mediations

As I have illustrated, the practices of observation in this case study require highly skilled vision, rely on prior biological knowledge and training, and are both situated and mediated. Drawing on three different concepts, two of which have been introduced in the theoretical framework of this book (Grasseni, Haraway, and Fleck), I conclude by introducing the concept of situated mediations. This concept will help explain how professional vision is determined by apprenticeship, and how visualisation technologies and biological vision co-constitute and intra-act with another. Thus, they do not replace skilled visions, but instead become a property of situated mediations. They facilitate how the context in which vision is employed defines what can be seen, thus becoming part of the knowledge that will eventually contribute to the scientific discourse and define what is disregarded and epistemologically obscured.

While Grasseni highlights vision as a professional, enskilled, and culturally determined technique, Haraway expands on this concept politically by emphasising that vision is never neutral and always situated. No matter if it is embodied vision or the technologies of vision, in either case, the visual capacity is mediated. What Grasseni calls skilled visions as a professional practice can be identified as one aspect of what Fleck called a 'thought style' that situates and defines a certain way of thinking within a thought collective, usually formed by representatives of a particular discipline:

> We can [...] define thought style as [the readiness for] directed perception, with corresponding mental and objective assimilation of what has been so perceived. It is characterized by common features in the problems of interest to a thought collective, by the judgement which the thought collective considers evident, and by the methods which it applies as a means of

> cognition. The thought style may also be accompanied by a technical and literary style characteristic of the given system of knowledge.[11]

Fleck also emphasises that vision is always directed and, thus, dependent on disposition, style, atmosphere, and perception, and on defining what is evident. He emphasises how the discourse is blind to external phenomena. Or, to put it in Margulis' words: 'Any idea we conceive as fact or truth is integrated into an entire style of thought, of which we are usually unaware'. This can be understood as 'the cultural constraints', 'trained incapacities', 'thought collectives', and 'social constructions of reality'.[12]

With situated mediations I focus on how the observations of the biologists are determined not only by the technological mediations, based on binoculars, cameras, and protocols but also by discursive, institutional, and political mediations. Situated mediations are the result of a thought collective. Thus, 'they affect all of us, including scientists. All are saddled with heavy linguistic, national, regional, and generational impediments to perception'.[13] Consequently, they are also affected by the individual situatedness of the biologists. These aspects cannot be treated as separate, and scientific observations are always the result of a partial perspective on material and immaterial practices. They are a co-constitution of body and senses, and of ontologies and epistemologies. Situated in relation to the situatedness of the biologists, they are the institutional dependencies, such as funding, the situatedness in the actual field, and the knowledge, experiences, and bodies of the individual biologists. They are mediated through the thought collective, bodily practices, and the senses, but simultaneously also through actual tools and media.

11
Fleck, *Genesis and Development of a Scientific Fact,* 99.
12
Lynn Margulis, *The Symbiotic Planet. A New Look At Evolution* (New York: Phoenix, 1998), 3.
13
Ibid.

The following three aspects are characteristics of situated mediations in my study. First, situated mediations as skilled visions are characterised as the ability to differentiate between important and less important events during observation and help to filter out – for the biologists – irrelevant information. Based on these, the biologists know what to focus on and what to disregard. They know how to observe the birds based on specific practices, tools, and visual technologies. This direct vision is supplemented by a secondary peripheral vision that allows the biologists to track events occurring outside their focus and thus maintain an overview. Second, the visual realm is accompanied by other senses, such as the auditory – for example, when calling the birds – which further helps to attract and identify them.

As part of the skilled visions, the biologists employ several tools and (bodily) techniques that culminate in a multitude of visual practices to study the birds' behaviours. Thus, this vision is supported by tools and media. These serve two purposes in this case. They work as extensions of the natural sensory capacity and extend the vision of the biologists, as I have discussed, so that they can see what they need to see and would not be able to see without it. In addition, they structure, frame, and guide the visions of the biologists. They do this based on 'focusing media'[14] such as behavioural observation protocols, by limiting the space of action to a minimum in the moment of the research activity. Together, the skilled visions and notation techniques help the biologists to filter, separate, and distil the information that is relevant for their research. They determine the visual capacity and what can be observed.

Third, skilled visions are learnt; from this perspective, they are a mediated process among biologists of the same thought style. The visual capacity is determined by their prior knowledge and their tasks, interest, and experience. They are situated within the body – thus embodied – and

14
Grasseni, 'Skilled Vision: An Apprenticeship in Breeding Aesthetics', 44.

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.