

Aesthetic Experience of Metabolic Processes

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AESTHETIC

EXPERIENCE

METABOLIC

PROCESSES

FÖRSTER

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Aesthetic Experience of Metabolic Processes

Future Ecologies Book Series

Edited by Petra Löffler, Claudia Mareis and Florian Sprenger

Desiree Foerster explores the impact of liminal experiences on human subjectivity. Her work often takes the form of collaborative research creation projects, where interactive art works intersect with her writings on process philosophy, speculative research, and aesthetic practice, such as with the Topological Media Lab, Concordia University (CA), Synthesis Center, Arizona State University (US), and IXDM, Basel (A). She is a postdoctoral instructor at the Cinema and Media Department at the University of Chicago, after graduating from the Institute for Arts and Media at the University of Potsdam.

Aesthetic Experience of Metabolic Processes

Desiree Förster



meson press

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Series Foreword: Future Ecologies

Edited by Petra Löffler, Claudia Mareis, and Florian Sprenger

The future of life on Earth has generated ongoing debates in academia, through which the concept of ecology has gained status by being able to connect disciplines across the natural sciences, humanities, arts, design and architecture. Criticism of the effects of climate change, which exacerbate existing inequalities in our global population, has spread from academia to the political and public spheres. At a time when the future of life on this planet is more uncertain than ever, the urgency of exploring other ways of thinking, acting and dwelling together is evident. This book series investigates emerging ecologies in uncertain worlds—ecologies that are open to the interests of other-than-humans and that care for plural modes of existence. By providing a platform for these topics and debates, we hope to contribute to a nature contract with the Earth as the shared common ground of water and minerals, air and birds, earth and woods, living and non-living, active and passive matter.

Future Ecologies is about a “time-space-mattering” that calls into question common knowledges about the relationship between space, place, territory, and the linearity of time in light of the circulation of matter, energies, and affect. It also questions the meaning of past ecologies and unsustainable futures for emergent ecologies, while problematizing the ambivalent histories of environmental knowledge, especially in the interplay of modernity and coloniality. Reading research in the *Future Ecologies* series allows you to take the many facets of past ecological thinking into account, to reveal its differentiated and often contradictory political implications and effects—and to criticize its, sometimes, naïve promises. Studying *Future Ecologies* means not taking for granted what ecology means.

The series promotes a relational thinking that is aware of the environmental, economic, social, and individual complexities of such a pluriverse driven by equally complex technologies and infrastructures. As Donna J. Haraway said, in a shared world “nothing is connected to everything, but everything is connected to something”. This connection generates and discloses different scales of responsibility. We dedicate this book series to all earthly critters who want to invent and try out new forms of life and styles of cohabitation, who ask which risks we want to and are able to take, and which futures we dream of. We invite contributions that address the geopolitical inequalities of climate change and capitalist extractivism, that deal with politics of (un)sustainability and (de)futureing, technologies of recycling and environing, non-anthropocentric epistemologies and practices of world-making.

The *Future Ecologies* series advocates for interdisciplinary approaches towards the numerous aspects of ecology. We invite junior and senior scholars from

various disciplines in media, cultural and literary studies, anthropology, design, architecture, and the arts to build collaborations between different voices, practices and knowledges—that is: heterogeneous communities of practice. By endorsing open access publishing, the series also aims to partake in the current transformation of the ecologies and economies of knowledge production.

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*Look at it as though you'd never seen anything
of the kind before, as though it had no name
and belonged to no recognizable class. Look at it
alertly but passively, receptively, without labelling
or judging or comparing.*

— Aldous Huxley, *The Island*, 1962

Introduction

An Aesthetic Experience of Metabolic Processes

The term *metabolism* is closely linked to our idea of balance, for it refers to the sum of chemical processes in a body that enable an organism to survive in a constantly changing environment. Originally, however, metabolism comes from Greek, *metabole*, meaning “to change.”

The term entered the English language in the late 19th century. Metabolic studies had been underway long before and might have started as early as the 13th century with Ibn al-Nafis, who stated that “the body and its parts are in a continuous state of dissolution and nourishment, so they are inevitably undergoing permanent change” (Meyerhof, Mahdi, and Schacht 1974, 232–34).

Only in the late 19th century (Kühne 1877, 291–324) and the beginning of 20th century (Sumner 1926, 435–41) was the concept of metabolism developed the way we know it today, as a necessary condition for life.

Metabolism not only serves as a concept to explain the origins of life; today, it also plays a role in the physical and emotional management of individual subjects. The pharmaceutical industry promises ways to “boost your metabolism,” which is connected to weight loss, while the sports industry aspires to training methods that account for metabolic processes to sustain and modulate one’s performance. In the 1960s, the concept also inspired people of the Metabolist movement in modern architecture in Japan to think about dynamic and self-evolving cities.

Metabolic processes interrelate us with the world. Just like air, they are not fully graspable, but, while air is what surrounds aerobic organisms and is essential for their survival, metabolic processes also happen internally to bodies. It is because of the metabolic capacity of bodies that an organism can extract oxygen from the air, which is needed to obtain energy from food and to expel wastes. Metabolic processes allow organisms to inhabit different environmental conditions, to adapt to changes in climate or diet, and to thus keep the organism capable of acting.

Even though metabolic processes happen all the time and are not necessarily noticeable to human subjects, they impact the way we feel, and how energetic we are in the face of obstacles, for example. Or how we plan ahead, what kind of nutrition ends up on our shopping lists; or where our attention goes, when we, for example, get hungry all of the sudden and all we can think of is where to find the closest restaurant.¹ But this is not a book about metabolism as a biological phenomenon. It is a book about the possibility of an aesthetic experience of metabolic processes—as they happen within our bodies and in our environment. More concretely, the aesthetics of metabolism I want to lay out in this book concerns meaning that arises in the environment through the intensified relations between sensing bodies and spatial surroundings.

Metabolic processes mark an intimate part of human engagement with the world. Accordingly, I came to this subject through a personal experience: a trip to Southeast Asia about ten years ago. This tourist adventure became significant to me in an unexpected way when the biological dimension of my culturally coded body—white, female, Western—became the site of metabolic transformation in trying to re-establish a balance with an unknown atmosphere.

I have spent most of my life in climate-controlled environments. As a result, I was overwhelmed after my first long-distance flight to the tropical climate of Thailand. After leaving the moderate climate in Germany and spending thirteen hours in the climate-controlled airplane, I was struck by the extreme climatic difference. Leaving the airplane, the density of the air, the distinct smell I could not yet identify, and the heavy humidity immediately enveloped me. In the face of this climatic experience, my fatigue and sore muscles, vestiges of the long flight, moved into the background of my awareness. It was the succession of these experiences that made me aware of them, of *how* I was experiencing being there in that moment rather than *what* I was experiencing. Stepping down the staircase of the airplane, the different climate affected me physically as well as emotionally; I felt as if I were stepping into a different world.

After a short while, the way I perceived my surroundings, how I felt like acting in it—in short, my attitude towards that world—adapted to the strange climate, and all my senses sharpened: Something had happened, a significant change in my environment that required the attention of my whole body and conscious awareness. I took in the special atmosphere of this country,

1 My use of the “we” in this and other passages is not to ignore the problem of generalizing rhetoric as, for example, discussed in the Anthropocene discourse. Large parts of my work are based on a phenomenological self-analysis and refer to processes as they occur in living bodies. Of course, it should not be overlooked that not all bodies are equal and not all human subjects have the same possibilities of responding to physical needs.

its smells and sounds, and became synaesthetically attentive to the sensual impressions of my surroundings. Of course, it did not take long for me to get used to the tropical climate. I adapted my daily routine and diet accordingly and quickly felt at home in the world again.

After some days in the city of Bangkok, I went up north for a trekking tour. And again, my body was put into a crisis. First, there was an immense sense of relief of escaping the dense heat and polluted air of the city. The north of Thailand welcomed me with fresh air and a cold breeze in the morning, and I felt vital and adventurous. I found myself getting excited to go on the trek I had planned—a prospect that had not excited me much a few days earlier while I was in Bangkok. And so, the trek began, and it was challenging. Really challenging. It led us through different altitudes and, at times, brought back the heat with its stultifying effect on me. I particularly remember one morning that affected me so deeply that the experience stuck with me and made me decide to begin this text by telling this story.

We started hiking early, around 6am, and it was already hot. After a coffee and light breakfast, we made our way up a steep hill, along a path that was barely recognizable. Our guide had a manner of being extremely mysterious about any information that would otherwise have given us some kind of orientation. Questions like “How far is it to the top?” were answered cryptically with an ambiguous head movement—a factor that did not make it any easier to bare the uphill hike. Not having anything to hold on to, no prospect of an end in sight, no idea what to expect up there, made it harder and harder for me to put one foot in front of the other.

The air was so hot and damp that breathing turned into gasping after only five minutes. The sweat ran down my back, and I felt at the end of my strength after a short time. Yet, a mere half an hour or so later, the hill became greener and the vegetation richer. I barely noticed the change in the surroundings at the time, as I was focused on walking uphill. But at one point, it felt as if we had crossed an invisible line. I was struck by the sudden freshness of the air. A cool breeze made me become refreshingly aware of my sweaty temples; I stopped and took a deep breath. The others did the same. We looked at each other, and my companions’ faces showed—probably like mine—signs of surprise and relief, and then the growing recognition that we were sharing an experience of importance.

What had happened? After almost two hours of steep uphill trekking, we had reached a critical point in the atmosphere at which the air was finally pleasantly cool and rich with oxygen. We found an air pocket in space. Through this experience, something peculiar about our being in the world became apparent: As humans, we are profoundly determined by our perception, and by the way we perceive ourselves and our surroundings

can take on different modes—from focused, intentional perception to aesthetic perception, which opens our senses to what is happening around us, without objectifying it immediately. Aesthetic perception can be understood, in this way, as a mode of perception in which we turn to the presence of something in its appearing, to the way it becomes sensuously perceivable (Seel 2005, 89). While my mode of perception prior to this shift could be described as narrowed, focused only on my next step and inattentive towards my surroundings, the aesthetic mode of perception—as I will understand it throughout this study—shifted my awareness towards the unfolding of the world around me, of the way my surroundings began to change, which I could experience with my full sensorium.

Shifting the mode of perception in this way had a crucial impact on my experience. While at first focused on reaching the crest of the hill, many aspects and processes in the surrounding environment and my own body were outside of my attention, whereas, by way of aesthetic perception, different aspects came to the fore that, until then, had stayed in the background of my awareness. The smell of the air around me, how my deep breathing was accompanied by a slight burning pain in my lungs, the different shades of green in the vegetation around me, the presence of the others. When I became aware of these aspects, they did not relate to any direct purpose; they had no meaning for my goal to reach the top of the hill. But they gave the particular situation a sense of presence, a presence that unfolded in these different sensual modalities, shifting in intensity. I was perceiving in an aesthetic way.

As mentioned above, an aesthetic perception can be defined, along with philosopher Martin Seel, as the perception of something in its appearing (2005, 89). Usually, in object perception, we constitute a fixed object and tend to neglect processual aspects. This allows us to easily identify the purpose of a thing and to put it to use. This way of perception is fundamental to navigating the world. In aesthetic perception, on the other hand, we open up to processual aspects of an object, and how it appears to a subject in a particular moment. Because of this momentariness, which is central to aesthetic perception, perception itself can be experienced as processual. As Seel points out, aesthetic perception is not an alternative to what we might call ordinary sensuous perception (2005, 20). Aesthetic perception is always already part of all other modes of perception, and we can thus turn to it at any moment. Aesthetic perception is, therefore, not only reserved for the perception of artworks, but can happen during a hike, or at any moment in the everyday.

For me, this shift in the mode of perception had an impact not only on how I experienced my surroundings, but also on how I experienced myself being part of a situation shared with others. It created a shared experience with my fellow hikers. We kept talking for a while about how we could finally

breathe deeply again and about details in our surroundings we were noticing. We realized how thirsty we were. I felt the unspoken relief that came with the realization that the others had gone through similar processes—the reassurance of a shared reality, a shared world. After a short break, we were able to continue our trek, and I felt much more energized. The remaining hour to the top seemed to be much easier all of the sudden.

Starting off with this subjective experience that I described phenomenologically, in the following, I will take a perspective that reflects the physiological processes that lead up to the possibility of aesthetic experience. I will explore art installations and design prototypes and discuss how an aesthetic mode of perception could possibly give access to the ways our bio-chemical dimension of being impacts our subjective experience. This bio-chemical dimension is regarded with a focus on metabolism.

Choosing an ephemeral topic such as subjective experience as a starting point requires an approach that is open to multiple perspectives, an approach that is at times more guessing, suggesting, and speculating than pointing out matters of fact. Subjective experience is difficult to grasp, although apparently self-evident. We seem to feel assured by being aware of our experience and being able to name it.

When climbing up the mountain, I was aware of the fact that it was me who was climbing. But how hard it was to breathe, the tensing of my muscles that accompanied each step, how my body regulated its temperature by sweating—these aspects of my subjective experience only came into my view in the face of a sudden change in my immediate surroundings, which ultimately led to a change in these bodily processes as well. It was this change I could sense: the increase in physical energy, the impact my deep breathing in of the fresh air had on my whole body.

I will term these aspects of our subjective experience in accordance with neuro-phenomenologist Clair Petitmengin (2007, 54–82), the *how* of our experience. In opposition to the *what*—the content of experience—*how* we experience is not usually acknowledged in conscious reflection. It seems to be instead placed before reflection, that is, it is pre-reflective.

My goal here is to analyze and explore precisely the unfolding experience of processes in one's own body, between the body and the environment, and the expression of familiarity towards these processes as a sign of recognition of a metabolic relation. The reason for this endeavor is my belief that a heightened sensitivity to minimal-affective processes inside and outside of our bodies can also help us to relate to events on a larger and more complex scale. What could an aesthetic practice do for the sensitization for climatic processes in our surroundings and the metabolic processes that go along with them? Can

a shift to the aesthetic mode of perception allow us to attune to the metabolic processes that are the condition of life itself?

In this text, I will attempt to answer these questions by examining different aesthetic situations that draw attention to the metabolic interrelations that exist between human subjects and their surrounding environments, thereby refining the subjective experience of metabolic processes. My approach to these examples is in part speculative. That is because the idea of an aesthetics of metabolism I want to develop here is linked to a shift in perspective that can be carried out, in principle, in any situation at any time. However, since this shift is unfamiliar to most of us and therefore has to be practiced, I have selected works of art and practices to explore and to *think with* it, by intensifying the interrelations between bodies and their atmospheric environments, to make such a shift in perspective easier. Following the traces of an aesthetics of metabolism in these works enables me to think about the conditions under which metabolic interrelations start to matter. In speculating with aesthetic situations, I want to propose an engagement with our environment that can lead to a shift of perspective in everyday life, that can intensify and bring to the fore aspects of our atmospheric and embodied reality that usually go unnoticed.

One can say that the artistic contexts here function as condensations of processes that lead to a shift in perception similar to that which occurred to me during my hike. They are similar to the air pocket that made me shift into an aesthetic mode of perception, places that make a contrast perceptible. This contrast is between the atmosphere within the artistically created site and an outside, between the experience of processes internal to our bodies and external to them, but also between sensual perception in the aesthetic sense and as related to a fixed object. This not only makes it possible to experience the processuality of climatic conditions, climatic conditions as not fixed, but also depends on uncountable parameters on the micro-level of the molecules as well as external factors such as bodies emitting heat. What also comes to attention is how the experience of our own being in the world is determined by different modes of perception and is therefore not fixed either.

The artistic contexts I focus on are installations in public space, parts of design biennales, and art laboratories. While these circumstances suggest an out-of-the-ordinary experience and lead to a certain expectation in the viewer, the bio-chemical processes that the selected projects bring forward—both internal and external to the bodies of the visitors—are mundane. The installations in this study intensify metabolic processes that are happening constantly and make them perceivable as they penetrate bodies and emotions, register in the environment, and allow for novel ways to act in that environment. They assemble metabolic bonds in subjective experience, a mediated scientific view

on metabolic processes, and their function within design strategies for future ways of habitation.

In the course of this study, I will understand aesthetics as an ontological method that brings to experience being-in-the-world as processes of transformation and exchange. Aesthetics were taken in the sense developed since Alexander Gottlieb Baumgarten's *Aesthetica* in 1750. Beginning with Baumgarten, aesthetics were no longer solely concerned with beauty, but instead with perception as a special capability that produces its own—sensuous—knowledge. Aesthetics thus depend on the understanding of the subject of experience and the world it encounters sensuously, as well as the mediation of this relation.

One way to attend to the world in such a way is given by practical aesthetics. Art historian Jill Bennett describes this category of aesthetic inquiry as follows:

[P]ractical aesthetics is the study of art as a means of apprehending the world via sense-based and affective processes—processes that touch bodies intimately and directly but that also underpin the emotions, sentiments and passions of public life. It is, then, the study of aesthetic perception at work in a social field. (2012, 43)

In line with this thought, I will explore art and design installations that use different modalities to intensify metabolic processes such that they can be experienced aesthetically. In exploring different modes and dimensions of experience when the medium of this relation is processual, as opposed to fixed objects, I hope to drive this discourse about an expansion of aesthetics forward to include metabolic processes in our body and our environment. Contrasting propositions, theories, and concepts from different disciplines with the affective quality of the materiality of atmospheres and the processuality of metabolism, I hope to contribute to phenomenological and materialist theories alike.

Situating an Aesthetics of Metabolism

This text investigates the aesthetic experience of metabolic processes through the medium of atmospheres. It engages, therefore, what is referred to as embodied aesthetics, as well as environmental or ecological aesthetics. In his writing about environmental media, John Durham Peters reminds us that the meaning of the Latin word “medium” is based on its environmental dimension. He summarizes medium as “ensembles of natural element and human craft” (2015, 3). In this sense, media not only enable environments “that provide habitats for diverse forms of life”; these habitats include other media as well (2015, 3). Atmospheres as media in the examples used in this text mediate between bio-chemical processes internal to bodies and in the environments

surrounding these bodies, thereby bringing to the foreground of awareness metabolic bonds that usually remain unnoticed.

The turn towards an environmental aesthetics is, of course, not new. Since the 1960's, eco-art has dealt with questions of perception and artificial environments. Hans Haacke's *Condensation Cube* (1963) is one famous example of an atmospheric process being exhibited inside the gallery space. The plexiglass box contained a one-centimeter-deep pool of water. With the increasing difference between the temperature inside the box and the temperature of the exhibition space, condensation would occur, visible to the viewer in the form of fogging and water running down the walls of the box. The visitors were so much a part of the exhibited metabolic process that their body heat contributed to the change in room temperature, which would build a contrast to the temperature inside the box and start off the process of condensation. This example shows how environmental artists, and land artists and ecological artists, for that matter, attempt to close the gap between the human observer and natural processes to include moments of chance, ambivalence, and randomness in their works.

But a media aesthetics, as media scholar Birgit Schneider emphasizes (2018, 26), deals not only with perception determined by certain media, but also with the respective forms of expression of the media themselves. If we understand media in their environmental sense as ensembles, the materiality of the media as well as other elements that are part of that ensemble start to matter, because their correlations determine the manner in which something is mediated. This can be exemplified with air understood as media.

While, as we have seen in the example of Haacke's installation, the condensation process of air can become visually observable, air, writes Schneider (2018, 36–37), transmits not only light, but also warmth, smells, and sounds, and makes them perceptible with senses other than our visual sense precisely because air itself is invisible. Air, itself a medium, always appears only mediated in its effects that become visible: the fog that rises, the draught of air on the body, through breathing. Air also plays a role in metabolic processes. Here, it is the composition of air, how much oxygen it carries, for example, that impacts metabolic processes, which can then lead to particular experiences. This text follows the questions: What aesthetic experience is specific to the articulation of metabolic processes? What are the perceivable effects of metabolic mediation, and why does this question matter today?

Exploring an aesthetics of metabolism means articulating sensual experiences that are ambiguous, minimal-affective, and perceivable only in contrast. This contrast can be induced by a change in the external surroundings, as in the atmosphere, or it can be internal to the body, as in the need for energy intake. To have an aesthetic experience of metabolic processes during my

hike, the atmospheric change had to be intense enough, had to cross a certain threshold, in order to impact how I felt and thereby catch my awareness.

Metabolic processes not only happen internal to bodies, as the biochemical processes that transform substances into energy or waste products. The terrestrial biospheric metabolism, for example, regulates the carbon cycle (Canadell et al. 2000, 115–30) in the atmosphere, and thereby allows us humans and other aerobic organisms to inhabit the planet Earth. Metabolism can also be extended towards evolutionary dynamics that create feedback loops between organisms and their environments, which have transformational effects on both, expressed, for example, by cultural changes or differences in social groups, or by the different structures of termite mounds (De Molina and Toledo 2014). These effects are inherent in the fact that connections between organisms and their environment can arise, persist, or be prevented. Metabolic processes, therefore, do not happen only internally to bodies, or outside in the environment, or in the atmosphere—they interrelate these different spatial scales and make evident that we do not exist in closed systems, that what has been inside our body, our home, our country, will re-appear outside of it, even though perhaps in different form at a distinct moment in time, and leave an impact.

Besides the potency of the term that lies in the connection of processes that take place inside bodies and outside of bodies, metabolism also allows us to reflect on the meaning of bodies themselves and to re-assign meaning to different bodies in face of today's ecological crisis. I will look at those metabolizing bodies in reference to *experience*. Using the term *metabolism* allows me to take into account modes of experience beyond or above human scales.

Experience, as philosopher Alfred N. Whitehead pointed out in the early 20th century, is not restricted to humans, not even to biological entities alone ([1929] 1985, 33). These experiences encompass different scales of time and space, and even though we cannot share the experience of a rock, becoming attentive towards expressions in our natural surroundings can be key in the face of the climate catastrophe today. As Monika Bakke points out in regard to the importance of geological processes:

Geological time ... is relevant not only when key scientific questions are considered concerning the planetary past, such as the chemical origins of life, but also in respect to the planet's future. The latter is closely tied to technological challenges arising vis-à-vis today's environmental crisis. As transformative forces creating disequilibrium and new evolutionary niches, metabolic networks are at the center of attention in fields such as synthetic biology, nanoscience, climate science, geoengineering, and many others. (2007, 42)

Following this statement, a key argument of this book is that the concept of metabolism can facilitate a turn towards processes and away from subject-object dichotomies, which can lead to a reconfigured conception of the relation between human and environment. The aesthetic mode that relates to metabolic processes, then, is one of *attunement*, and the perspective that is enabled by this attunement I will term *metabolic subjectivity*.

Attunement in English has been used since 1820 in relation to music. It originally meant “to bring something into harmony.” A musical instrument can be “tuned.” It is also related to the concept of “mood” as philosopher Erik Wallrup points out (2015, 1). According to Wallrup, we can be “tuned in” by a melody, which changes our mood instantly. *Attunement* as a term encompasses many meanings of the relation between bodies and their surrounding environment that render this relation as permeable and not as something fixed. As part of Seel’s aesthetic theory, attunement is meant in the sense of becoming attentive to something in its appearing: Something—a thing, an artwork—is acknowledged in the way it appears to our senses here and now, detached from any purpose beyond this moment. At the same time, the situation of perception of this appearing and the presence of this appearing become relevant as well (Seel 2005, 16). When I entered the air pocket during the hike, I not only perceived the differences in my surroundings, how everything appeared greener, more vital. My sudden awareness also changed *how* I perceived these differences in my surroundings, what meaning I addressed to them, how emotionally affected I became. In this way, I attuned to the atmosphere that surrounded me in this particular moment, which stood in contrast to the atmospheric composition further down the hill.

In the following, I am interested in the question of how contexts of experience can help us attune to metabolic and atmospheric processes, and how contexts relate the human body to an environment that is shared with other entities, such as chemicals, algae, and plants. This attunement to the appearing of something in perception in a specific situation introduces a different relation between subject and object, because it does not represent a fixed object of perception: While we attune to something in its appearing, the distinction between subject and object by way of describable qualities of objects can no longer hold easily.

I thereby consider a phase that comes before what Whitehead called the “bifurcation of nature” ([1929] 1985, 289). This bifurcation splits reality into an objective reality and its subjective perception, which leads to a dichotomic relation of subject and object, and, in the following, allows the object’s utilization. Attunement, other than the description of an object by its essential or phenomenological qualities, takes the processuality of the appearing of the object and the perception of this process into account. Thereby, the subject and object can both be understood as being in the process of appearing, of

establishing those bonds that lead to the subjective grasp of an object in a specific situation.

This way of relating attunement to a phase before the bifurcation of nature corresponds with philosopher Vinciane Despret's definition of attunement as a "new articulation of 'with-ness,'" an undetermined articulation of "being with" (2004, 131) that points towards a larger context of encounter. Being as being-with further suggests a rather open understanding of the conscious human subject, which here joins an undefined other.

If, in this study, attunement is taken as a way to articulate being-with through metabolic processes, then the different sense-modalities on an individual body level that notice the effects of metabolic processes, as well as the affective qualities that come with them, become relevant. These sense-modalities and affective qualities are investigated in different art and design works. One example are the architectural projects of Philippe Rahm, which lie somewhere between experimental studies, cognitive science, art, and architecture. Rahm creates spaces composed through atmospheric media such as oxygen, temperature, air flow, and light. In his installations *Hormonorium* and *Interior Weather*, one is able to experience the effects of the small-scale affects these media have on the body. Instead of displaying objects, he designs atmospheres to provoke certain emotions and to trigger behaviors that guide the experiencing subject in the way a space is to be inhabited.

After discussing Rahm's work, I will use two public installations, *Urban Algae Canopy* by Ecologic Studio and *Oxygenator* by Joanna Rajkowska, to explore how metabolic processes register in the environment in such a way that they impact what we pay attention to. While, in Rahm's work, differences in climatic conditions impact the way one feels, are internalized by an organism and expressed in physical and emotional effects, in *Oxygenator* and *Urban Algae Canopy*, this dynamic takes a reciprocal turn. First, the environment is being re-shaped in order to have certain sensual effects that can be internalized by human subjects. Second, it is being altered by the externalization of those internal states.

In what follows, I will extend my analysis of existing artworks and include my own aesthetic practice. As this text is about subjective experience of metabolic and atmospheric processes, this extension seems natural to me, but of course, it goes along with a change of perspective to which I would like to invite the reader. I will describe two prototypes for an installation called *Affective Atmospheres*, which I co-created with artists and researchers from different disciplines during the time of my writing. The two prototypes were composed of an aquarium filled with water that would turn into waves, bubbles, and, finally, clouds. But instead of featuring these different states of the water as events, the prototypes highlighted the material shifts in the aggregate states

that led up to them, and allowed us to sensually experience the environmental dependencies that would trigger them. An immersive environment such as *Affective Atmospheres* offers, thereby, a multimodal experience and playful engagement with phenomena like clouds, which usually remain abstract. In analyzing these different projects, I aim to articulate the different modes of perception that engage in an attunement to metabolic processes and the perspectives on the relation between the human and its environment that might arise from such aesthetic experiences.

On Methodology

The goal of this study is to extend the notion of aesthetic experience to include minimal-affective processes that happen internally and externally to our bodies, which can be sensed by different sense modalities but not necessarily perceived in their being-so. Sensuous perception that includes, aside from visual perception, our auditory sense, olfaction, gustation, somatosensation, thermoception, and proprioception is open to aspects and processes in the environment that are often difficult to describe, but that can affect us deeply. Following this objective, I will describe aesthetic milieus that provide a context to experience interrelations with the world on different levels and in the inclusion of different sensual modes—from the micro-scale of bio-chemical processes inside bodies to atmospheric processes that register in the outer environment.

Engaging with aesthetic milieus that intensify atmospheric and metabolic processes in such a way that a new intuitive way of relating to our environment is enabled does not simply integrate itself into the theories of media ecology or aesthetic theory. Rather, the concepts of these directions of thought are called into question. In looking at aesthetic projects that are in between spatial design, art, and experiment, I aim to contribute to an opening of media studies and art history towards biology and cognitive sciences, questioning the new meaning that arises from an expanded framework of experience. In describing these experiences, I will refer to different notions of experience in order to reflect on something that necessarily withdraws from reflection: the phases of experience that mark the threshold of our perceivability when it comes to our atmospheric surroundings and our own bodies.

This threshold of perceivability presents itself as messy. Emotions, feelings, thoughts, memories, and all kinds of bodily processes intermingle in these phases, from which our conscious thoughts arise. The knowledge of this complexity and of the rather small part of what we are conscious of in our daily life has occupied many disciplines and theoreticians. The cognitive sciences speak of the liminal self (Zahavi 2010, 3–11) and pre-reflective experience (Legrand 2017, 583–99); phenomenology speaks of intersubjectivity (Husserl [1929–1935]

1973; Merleau-Ponty 1968); process-oriented philosophies of the pre-individual (Simondon [1989b] 2016); and perception in terms of causal efficacy (Whitehead [1929] 1985). This questioning of the way our conscious perception is structured comes with implications for ethical and political questions. Aesthetics and their subversive power become evident today especially in the discourse of everyday aesthetics: “By indicating the ways that enable to redistribute the sensible,” therefore, philosopher Margus Vihalem states, “everyday aesthetics engages in going beyond the insurmountable divide between the sensuous and the intelligible, once established by Plato” (2018, 1).

To do justice to this, I will refer to studies from various disciplines that all have in common that they favor an expanded view of the relation between the human and its environment, that does not put the human conscious self at its center. While my writing is guided by the pragmatist philosophy of John Dewey, the process philosophy of Whitehead, the phenomenology of Merleau-Ponty, and the philosophy of Martin Heidegger, my approach is informed by theories of embodiment from the cognitive sciences as well. Scholars like Claire Petitmengin and Shaun Gallagher have contributed greatly to discussions of embodiment and pre-reflective experience in the cognitive sciences (Petitmengin 2017; Gallagher, 2017). In the context of my writing, they give the opportunity to re-perspectivate concepts of embodiment as developed in phenomenology, and to relate them to the question of learning through experience in the sense of Dewey.

In articulating aesthetic modes of experiencing metabolic processes, I aim to expand our understanding of media as well. As John Durham Peters stresses, we need a philosophy of media that includes the elemental dimension of our world—air, water, fire, earth. Peters thinks it would be “crazy” to not consider that nature expresses meaning (2015, 1). I will add, here, the bio-chemical dimension of the world: the metabolic processes that embed us in nature. My proposal is that we not only need new forms of representation of planetary, climatic, and therefore atmospheric processes, but also must understand our own bodies as always being involved in such processes.

The underestimation of the elemental dimension that Peters diagnosed also plays a role in the current debates about climate change. The discourse on climate change, as Schneider points out, often refers to a phenomenological gap (2018, 21). The environmental crisis seems to be so extensive and neither temporally nor spatially comprehensible to an individual that the resulting feeling of powerlessness predominates, and necessary changes in lifestyle, especially in industrialized nations, fail to materialize (Kirksey 2016, 51). The aesthetic experience of atmospheric and metabolic processes, as I will explore it in this text, is not able to fill this phenomenological gap. Instead, as I will show throughout the study of aesthetic milieus, aesthetic experience brings into view the processuality of perception, the phases of experience

that lead up to a meaningful reference to the world, and how these phases contain new potentialities for being. To this end, I explore a development of the phenomenological method by considering processes that cannot be perceived in a sensory way, at least not in their totality, but that nevertheless have certain effects on our perceptual apparatus. In bringing these effects to the foreground of our awareness, aesthetic perception can make us familiar with the fact that our relationship to the world is more than intentionally determined. The questions that this multiplication of perspective brings with it are discussed in this text. If an attunement to metabolic processes in our own body and our surroundings enables the appearing of aspects of this embeddedness in aesthetic perception, we might arrive at different concepts about our being in the world. I thereby want to contribute to the exploration of new forms to express possible relations between organisms and environments, which has the potential to reveal new structures of meaning in the world. In my contribution, these relations are enabled by our metabolic capacity. In order to express the relations that come with our metabolic dimension of being, I want to propose an extension of terminology in aesthetics able to encompass the materially affective dimensions of our being.

Besides *metabolism*, which allows me to explore a perspective that is attuned to transformation, process, and exchange, I will use further terminology from the cognitive sciences and biology to expand the concept of aesthetic experience. The term *interoception* allows me to study the experience of processes internal to our bodies. Also known as *gut feeling*, interoception allows us to feel hungry or thirsty. It can also relate to physical pain or awareness of our breath or heartbeat. An investigation of interoception as that sense being triggered in an embodied, metabolic aesthetic will show that interoception is crucial in processes of developing a sense of self and other, of becoming a social being.

Stigmergy will be used to explore how we sense metabolic processes as they register in the environment. The term was first used by entomologist Pierre-Paul Grassé (1982) to explain a mechanism of coordination used by insects. Examples include termite colonies and their indirect communication via the environment, and ants that leave pheromone trails to mark food sources. Stigmergy is, thus, used to explain the cooperation and self-organization of large groups, in which the agents communicate through changes in the shared environment.

Mimesis is a term with a rich history in philosophy and biology, going back to the ancient Greeks. Mimicry, as derived from mimesis, is commonly defined as “the action, practice, or art of mimicking or closely imitating ... the manner, gesture, speech, or mode of actions and persons, or the superficial characteristics of a thing” (Oxford Online Dictionaries, 2017). Twentieth-century scholars such as Walter Benjamin, René Girard, Roger Caillois, and Jacques

Derrida expanded the term and related it to social practices and interpersonal relations. In my study, I will use mimicry to describe how metabolic processes can manifest in the form of new behavior in an aesthetic milieu that suggests a learning from the aesthetic experience of atmospheric processes. Interoception, stigmergy, and mimesis, as three ways of sensing and expressing metabolic processes, will help me to sort out different ways of engaging with the environment in a meaningful manner that can be intensified in aesthetic situations.

While my methodological approach reconsiders, on the one hand, forms of experience as described in process philosophy, phenomenology, and pragmatism, and uses, on the other hand, concepts from biology and cognitive science to re-situate these experiences into a theory of aesthetics, it also contains an aesthetic practice. During the research on my thesis, I came into contact with philosophers and artists from the *Synthesis Lab* at *Arizona State University*, and the *Topological Media Lab* at *Concordia University*, Montreal. What began with a discussion of our respective works led to the development of a joint project that combined my philosophical, media-theoretical questions with explorative material studies, leading to an aesthetic practice that became central to my thesis. During two workshops, we developed installations that brought climatic processes and how they are affected by environmental dependencies at an arm's length from the perceiver. This exploration, which will be discussed in detail in chapter four, has allowed me to contrast my theoretical reflections with actual sensory, affective experiences. This has led to a permanent reformulation and exploration of what can be grasped by conceptual thought. This tension between experience and its semantic representation runs through the present work. I do not aim to overcome this tension, and I do not state that my descriptions are able to express what necessarily forgoes any representation. What I am trying to do, instead, is to interpret which processes lead to the representation, and to what extent such a detailed exploration can ultimately influence our assumptions, and how we think and act.

My writing, therefore, inquires into new perspectives through a more nuanced description of the experience of climatic and metabolic processes and how aesthetic practice can contribute to such an investigation. In the same line of thought as that of scholars like Sha Xin Wei, who investigate the potential of novel exchanges between philosophy and art, I therefore intend to develop pluralistic perspectives on the relationship between humans and their environments, examining their potential for creative engagement. To do so, it is necessary to “suspend or bracket certain conventions about what constitutes body, subject, or ego while trying to develop a working understanding of embodiment and subjectivation—the formation of subjective experience” (Sha 2013, vii).

Chapter Synopsis

In the following chapters, I will explore different dimensions of experience through close-readings of installations that use atmospheric elements in distinctive ways. In chapter three, I will explore two installations by Philippe Rahm. In Rahm's work, it is the bio-chemical dimension of the body that becomes the center of attention; aesthetic perception draws the experiencing subject inwards, towards the internal metabolic processes and how they impact the way we feel and act. Following his concept of *Meteorological Architecture*, Rahm understands architectural space, first, according to the unfolding climatic processes, and only secondarily in the sense of functional design. He applies temperature changes and light compositions, and tweaks oxygen levels in order to create more sustainable living spaces.

The fourth chapter will explore two aesthetic milieus implemented in the public space, using oxygen as a medium for collective experience. The art installation *Oxygenator*, by Joanna Rajkowska, is an example of the ways atmospheres can impact our moods, actions, and how we relate to a space. The vagueness of atmospheres might bring to the foreground hidden traumas, divergent opinions, or the complicated nature of the concept of *care*. In the second installation, *Urban Algae Canopy*, by Ecologic Studio, oxygen functions as a mediator for the atmospheric composition of a space shared by humans and algae alike. Here, the ongoing bio-chemical exchange between human entities and algae becomes part of the environment itself. Investigating *Oxygenator* and *Urban Algae Canopy*, I will show how atmospheres can be thought of as media for processes on distinct scales of time. The biological concept of stigmergy will allow me to think through contexts of experience that highlight the sentience of environments and how they register changes in the atmosphere, and thereby express a metabolic relationship that unfolds over time.

In chapter five, I will describe the installation *Affective Atmospheres*, which I co-created during my work on this book and that I already introduced in the previous section. I will explicate how we can become familiar with atmospheric processes and expand our scope for action in engagement with an environment that changes continuously.

Finally, I will use the insights gathered to propose aesthetic experience of metabolic processes as fundamental to gaining a new and much needed perspective on the relation between humans and their environments. Can an exploration of atmospheric and metabolic processes, and how they express relations between perceiver and surroundings, point towards a new meaning for aesthetics as part of an educational theory as well? In the conclusion, I will suggest that aesthetic milieus could be understood as learning environments for an attunement to the processual character of being in the world, and are

not limited to the context of art or religion, but are, in fact, the background of our everyday experience. An aesthetics of metabolism is, thus, placed in a larger and altogether practical context, and the question of how we would like to live in the future is newly contextualized.

Before I turn to the works of art, however, a short introduction to the terminology of an aesthetics of metabolism is necessary.

[1]

Terms of an Aesthetics of Metabolism

Environment, Milieu, Atmosphere—A Clarification of Terms

Exploring new perspectives on the relation of humans and their environments, I ought to first clarify my understanding of terms such as *environment*, *surrounding*, *milieu*, and *atmosphere*. The term *environment* leads back to the French proposition *environ*, which means “around.” My approach to the terminology is inspired by ecological theories as developed by biologist Jakob von Uexküll ([1909] 2014), who described a foundational link between the environment of an organism, which is mediated by its sense perception, its internal environment, and behavior. For Uexküll, the environment (*Umwelt*) was that *which surrounds* an organism, the particular surroundings that the organism sensually and habitually engages with. He distinguished *Umwelt* from *Umgebung*, which could be described as the objective reality of the organism that is not perceivable by the organism in its totality. Thus, every living being is attributed a species-specific embodied perception. From a biological point of view, this relation between the organism and its environment is assumed to be the same as between the microscopic, cellular parts of an organism and the organism as a whole.

The concept of environment has been virulent beyond the biological discourse over the past years, influencing theories on action- and decision-making, as, for example, part of digital and computational studies. Furthermore, environment has been used in accordance with *medium*, *ambiance*, and *atmospheres*, as Florian Sprenger pointed out in his study of the term. Thereby, the notion of environment not only goes far beyond the fields of biology and ecology,

but also becomes more and more ambiguous (Sprenger 2014, 9). While environment suggests an interrelation of an *outer* and an *inner*, such as in an ecological system, the term *milieu* challenges the implicated causality of such a relationship of living beings and their surroundings (Sprenger 2014, 9). Literally the French word for “middle”, the English use of *milieu* points towards a center that can be considered on different scales, between different entities. The biochemical *milieu* within an organism, thereby, can be considered analogous to the atmospheric *milieu* that embeds that organism in a specific environment, and so on. Understanding organisms as part of *milieus* that are interrelated on different scales allows us to address living beings as effects of specific constellations and not just as causes.

I will not go deeper into this terminological history, as it can be comprehensively reviewed in Sprenger’s essay. At this point, I ought to clarify the pragmatic sense in which I will use the different terms that so often get mixed up. I will use the notions of environment and surroundings in accordance with Uexküll. Environment, in this sense, contains more than surroundings; it can refer to weather patterns or other factors that impact an organism. An environment is also shared with other organisms. *Surroundings* apply to that which surrounds an organism, what an organism perceives and interacts with in a certain moment.

Surroundings also depend on the sensual capacities of the organism. Its biological apparatus, which enables communication with the world, creates different sense modalities through which the organism perceives and signals to the environment. At the same time, a subject can be a very different object to the perception of other subjects, as Uexküll describes with the example of an oak tree, being an environment for humans, beetles, foxes, birds, and so on:

In the hundred different environments of its inhabitants, the oak plays an ever-changing role as object, sometimes with some parts, sometimes with others. The same parts are alternately large and small. Its wood is both hard and soft; it serves for attack and for defense. If one wanted to summarize all the different characteristics shown by the oak as an object, this would only give rise to chaos. Yet these are only parts of a subject that is solidly put together in itself, which carries and shelters all environments—one which is never known by all the subjects of these environments and never knowable for them. (2010, 132)

Thereby, every organism, together with its surroundings, forms specific contexts of experience—this is what von Uexküll calls *Umwelt*. These contexts of experience will be regarded in relation to the aesthetic expressions of metabolic processes. The term *milieu* will therefore mainly be used to describe

aesthetic milieus as aesthetic forms that recreate or modify our experience of being in an environment.

An aesthetic milieu gives way to reflecting about aesthetic experiences and allows one to consider a situational context that includes the observer and their sensual, biological capacities, together with the object in its appearing. The factors that participate in this situation—whether they be the ideological meaning that affects the way one perceives a fresco in a church or the shift in the amount of oxygen in the air that made me relate differently to my surroundings during the hike—are not necessarily perceived as such, but they give the situation a certain *tone*. Tone, like attunement, comes from musical theory, and means the certain quality of a sound, a certain expression, as in *timbre*. Tone can also apply to a certain mood or emotional state. Both meanings make its relation to attunement clear. In this sense, the term *aesthetic milieu* was also used by theologian Frank Burch Brown to describe those aesthetic forms that affect ideas and volitions, as well as emotions and senses. Thereby, an abstract idea can take on “reflective, affective, and indeed moral depth in an aesthetic milieu” (1993, 1). In an aesthetic milieu, which for Brown can be, for example, the architectural structure of a church, a dynamic interaction is enacted between aesthetic forms or qualities and non-aesthetic ideas or perceptions (1993, 49). In the following, I will use the term *aesthetic milieu* without the theological connotation given by Brown and will focus on the potential of aesthetic milieus to offer the appearing of correspondences between qualities that can be perceived sensuously, in other words, are aesthetic in this sense, and that are non-aesthetic, as in not perceivable to the senses. This is why I have chosen to speak of attunement towards metabolic processes and not perception of them, which would suggest that they can become phenomenological describable in themselves. Rather, metabolic processes come into view through their effects on different registers.

The notion of aesthetic milieu allows me to study how aesthetic qualities of metabolic processes that we can sense come together with those non-aesthetic effects of metabolic processes in aesthetic experience. If we regard the air pocket in Thailand as an aesthetic milieu, then my aesthetic experience of the metabolic processes only became perceivable in their effects on my feeling, sensing, and behavior. This example allows me to think through how climatic conditions and their effects on our experience can be expressed in a way that we can relate to them and reflect on them, even though they can never be grasped fully. More than altering or capturing the atmosphere of a place, an aesthetic milieu intensifies certain aspects in the surroundings, gradually shifts perceptible thresholds, and thereby brings to the foreground of our awareness ways in which we are always already engaged with the world around us.

This brings me to the last term in this section. The term *atmosphere* goes back to the Greek *atmos* (vapor, steam) and *sphaira* (sphere), and refers to the layer of gas that surrounds the earth. The atmosphere of the earth is a subject in many scientific inquiries, such as meteorology, which is concerned with climatic conditions and weather prediction. The later and rather metaphorical use to describe moods and feelings is deeply engrained today in our language and culture, which is visible in terms such as “political atmosphere,” the “atmosphere of a place,” and so forth. The range of how we experience an atmosphere in the latter sense is wide, going from an “atmosphere that comes over us” to one that “is not noticeable at all,” (Schmitz 2014, 69 [own translation]) as philosopher Hermann Schmitz remarked in his comprehensive writing about atmospheres. They can add a certain tone or mood to a situation, that one can attune to—but in their “coming over us,” which Schmitz speaks about, they also express an agency, an affective quality that never comes into full appearance. Atmospheres, in this phenomenological sense, can make present *what* is sensually experienced and, at the same time, can make present the perceiver in their *act of sensing*, because they form the background that serves the formation and abstraction of objects, forms, and colors against that background. And at the same time, atmospheres can “come over us” and impose a sudden shift in awareness, thereby stepping from the background to the foreground of our attention. Becoming aware of the processuality that lies in this shift from the background to the foreground tells us again something about perception as being processual itself.

Atmospheres have been the subject of philosophers and, in the last 60 years, have been increasingly explored as a theme in both art and architecture (Zumthor 2006; Pallasmaa 2014). For cultural theorist Gernot Böhme, atmospheres mark the in-between of things, of subjects and objects—they neither belong to subjects nor the physical environment alone, which caused him to argue that they become the ontological principle par excellence (1993, 125). However, this way of framing atmospheres has been criticized as reductional because it hinges on the dichotomy of subjects and objects. Schmitz, for example, states that atmospheres are not an in-between of subjects and objects, but rather, subjects and objects are phenomena that emerge from atmospheric flows (1998). Opposed to Böhme, who understood the concept of atmosphere as foundational to any aesthetics, Seel goes against this generalization of the term and describes atmospheric perception instead as only one dimension of aesthetic perception: “Something reveals itself in atmospheric appearing when it becomes intuitable in its existential significance to the perceivers.” (2005, 92) Here, too, the emergence of subject and object in the act of sensing is being suggested, if we understand both terms not as something fixed. This last point by Seel will be explicated further in the next section.

Atmospheres as the spatial quality of emotions and moods have been used in recent studies, notably in media studies, linking affect with the flows that envelop humans and other beings in space (Massumi 2002; Gregg and Seigworth 2010; Blackman 2012; Angerer 2017). In this context, some theorists argue that the body has been neglected for too long in the humanities. Thinking with affect is meant here to articulate what belongs to a pre-personal dimension, which cannot easily be grasped linguistically. Although affect theories have been criticized for merely replacing an attention to ideology or belief with a focus on bodily affects that are understood as outcomes of subliminal, autonomic corporeal processes (Leys 2017), they also have been credited an important role in presenting alternatives to the poststructuralist focus on discourse (Bladow and Ladino 2018). While I regard atmospheres in their actual bio-chemical composition as they envelop us in space (McCormack 2018, 5), I also understand them as mediating experiences and, along with Seel, as a mode of perception that goes beyond the objective being-so of an object or situation (2005, 95). For Seel, atmospheric perception is part of aesthetic perception. In atmospheric perception, just as in aesthetic perception, a thing is not just perceived in its being-so or as a tool to be used in a certain way. Being freed from the intentional grasp, various qualities can come to the foreground, such as a color, the ground the thing is placed upon, the different contexts in which the object could have been seen before.

Particular to atmospheric perception is that, in this acknowledgment of different contexts, in which the perceived object has appeared or might appear, the perceiver can become aware of correspondences that relate to their personal life. Scenes in which the object has played a role in the past might come to mind, or ideas of what to do with it next. Becoming aware of these different possible perspectives on an object, we can also reflect on the process of perception itself, and how the formation of a subject—as that which is able to engage with its environment, emerges from this process. The following section will explore this more deeply.

Experience, Perception, Affect

Aesthetic milieus that intensify metabolic processes within the body or in the environment create a context to experience these processes in different ways: as a physical feeling, a mood, or thought, but also by way of bodily actions that register and mediate processes before we reflect on them consciously. In the environment, they can register in the form of perceivable patterns; colors of plants might appear more intense, their growth denser. In this way, the sensibility of nature, which exists in the fact that it changes permanently in response to environmental factors, such as, for example, climate change, can itself be perceived sensuously. The metabolic bonds that embed human organisms in their environment thereby co-create their context of experience.

In the following, I will briefly describe the different modes and concepts of experience that I will be referring to throughout this thesis in order to articulate an aesthetics of metabolism.

Central to my research have been theories of embodiment in cognitive sciences and phenomenology that focus on the bodily dimensions of experience and how they prime the ways we establish, lose, and re-establish meaningful interactions between ourselves and our environment. Thereby, the qualitative and subjective aspect of phenomenal consciousness is inter-linked: *How* I experience something, what it is like to experience, and that I am the one experiencing it this way, are not considered separately (Petitmengin 2017, 143). This view was brought forward by biologist, philosopher, and neuroscientist Francisco Varela, who coined the term *enactivism*. He attempted a new understanding of subjectivity as a mutual conditioning of body and mind, thereby responding to a concept of subjectivity that would put a large emphasis on cognition and understanding the body as being governed by the brain. To explain this mutual conditioning of body and mind, Varela wanted to find a way to describe how perception and action emerge at the same time, or are otherwise intrinsically linked. That way, it would not be a brain directing bodily movements after the visual sense transmits data from the environment, but instead, the way we perceive and act could be understood as emerging together (Varela [1929] 1999). He proposed viewing the relation between the organism and the world as being coupled and not as opposites. In this way, the organism cannot do anything other than continuously engage with its surroundings, in manifold ways: “[The] world is not something given to us but something we engage in by moving, touching, breathing, and eating. This is what I call *cognition as enaction* since enaction connotes this bringing forth by concrete handling” ([1929] 1999, 95). Engagement with the world as understood in this field of cognitive science thus contains different bodily processes, through which the body is interrelated with the environment. Cognition—as mental actions—cannot be regarded as separate from the body. Even though bodily processes do not necessarily come to our conscious awareness, they impact us in a pre-reflective manner.

Understanding pre-reflective experiences as preceding our conscious reference to the world, while, at the same time, creating something like a meaningful relation to the world and priming conscious reference that follows from there, can be further explored with Whitehead’s process philosophy. Whitehead differentiated between perception in the mode of *presentational immediacy* and perception in the mode of *causal efficacy* in order to clarify the inaccuracy of mistaking an abstraction, a belief, or a representation with the concrete real event or physical entity, which, at the time, he diagnosed for philosophy as well as the natural sciences. In his treatise, *Process and Reality*, from 1929, he aimed at challenging our representations and abstractions of

nature and perception—not to question abstractions and their usage as such, but rather the process through which we get to them.

Presentational immediacy is connected to pure sense perception, and causal efficacy allows for the basic perception of causal relatedness. In human experience, *symbolic reference* functions as an intermediary element between the two modes. Symbolic reference brings that which is gathered in pure sense perception and in interpretive causal efficacy, into a “unity of feeling” (Whitehead [1929] 1985, 168)—which can be identified with what we call “higher cognitive functions,” including representing, planning, and monitoring. Perception in the mode of causal efficacy and in the mode of presentational immediacy is not preserved for higher-order organisms alone, and it is in the phase of symbolic reference that errors can occur—that we, for example, mistake a reflection in a mirror for something real.

With his emphasis on perception as encompassing different modes, Whitehead stepped away from strong notions of *subject* and *object*, which he replaced with the term “occasions of experience.” Occasions of experience always encompass both subject and object, as they emerge from experience. In process-thought, conscious experience, thereby, is dismantled as just one part of experience, a rare modification, as philosopher Paul Stenner sums up this point in Whitehead:

First, conscious experience is not essential to experience but a high-grade and rare modification of more fundamental experience: it is the crown and not the base of experience. Second, experience is more like a going through which patterns the world. For both James and Whitehead, the universe is no longer conceived in terms of basic building blocks of enduring matter (pure physical atoms), but as being composed out of activity that is ultimately analyzable only into interconnected and concatenated streams of events (occurrences, happenings, occasions during which something is ‘gone through.’ (2018, 122)

The mode of perception that concerns these experiences is one that tackles a different understanding of subjectivity, as processual itself. But process thought does not follow the statement that everything flows; rather, those events we experience are made of a series of smaller events, of phases, which might or might not lead to an event that we can consciously experience. To exemplify this, we could look at the micro-scale of our body, how the cells form body tissue, organs, bones, limbs, and, finally, the shape of our body we refer to as *my body*. In the artworks I analyze, such as Rahm’s installations, these bodily processes are intensified in such a way that we can experience their effects on how we feel, perceive, and act.

The philosophical question I want to address in this study is non-trivial: How can we harmonize a framework of process thought with subjective experience

and an aesthetic theory that is able to account for those shifts in perception that lead to new meaningful experiences? Meaningful experiences are, for Dewey, cumulative experiences that form a context for a series of different experiences—that make them stand out as meaningful to a subject. The sum of the different experiences during my hike, for example, become meaningful to me if I regard them from a metabolic perspective. How I perceived my environment and my own body, how attentive or inattentive I was, makes sense considering the difference in atmospheric composition I encountered throughout the hike. I will briefly review Dewey's concept of aesthetic experience to explain how this relates to my study.

According to Dewey, experience itself appears as a continuous flow. Yet, this flow encompasses phases within which experience can become meaningful to the subject, can be reflected upon and lead to "new beginnings of experience" (Dewey [1934] 1980, 17). This is in part because, in Dewey's understanding, the experiencing subject encounters constant conflict in the world. The subject is in permanent struggle with reality:

In the process of living, attainment of a period of equilibrium is at the same time the initiation of a new relation to the environment, one that brings with it potency of new adjustments to be made through struggle. The time of consummation is also one of beginning anew. Any attempt to perpetuate beyond its term the enjoyment attending the time of fulfillment and harmony constitutes withdrawal from the world. Hence it marks the lowering and loss of vitality. But, through the phases of perturbation and conflict, there abides the deep-seated memory of an underlying harmony, the sense of which haunts life like the sense of being founded on a rock. (Dewey [1934] 1980, 17)

Terms like *equilibrium* and *harmony*, which Dewey applies here, must be seen as pragmatic choices to describe the relation between the living organism and its environment in a particular situation and not as the expression of an idealistic system of thought. Instead, for Dewey, thinking about the living being as constantly struggling with the gap between expectations and reality allows him to think of life as being inherently creative. An aesthetic experience then allows us to structure experiences regarding this conflicting engagement with the world and is therefore not only experience in the sense of a state or mode of a sensitive entity, but operational. Aesthetic experience is a sense-making process; it enables us to have new experiences outside of the anticipation of a future or attachments to a past. An aesthetic experience is the feeling of a momentary "unity" with the world:

Only when the past ceases to trouble and anticipations of the future are not perturbing is a being wholly united with his environment and therefore fully alive ... To grasp the sources of esthetic experience it is,

therefore, necessary to have recourse to animal life below the human scale." (Dewey [1934] 1980, 18)

In my understanding, aesthetic experience is not a matter of higher-order cognition, of representation and reflection, but instead of an attunement to a world that cannot be completely consciously grasped. In this way, my personal experience of the air pocket in Thailand has stood out for me thus far as an aesthetic experience, a moment of felt presence that charged my experience with meaning. Talking about the embodied relations between an organism and its environment and how they prime subjective experience brings into view the rich findings of affect theories. Affect studies have a cross-disciplinary approach whose beginnings are often referred back to Spinoza, with his special attention to a body's affects (Gregg and Seigworth 2010, 10). Affect seems further to be located in or mediating the pre-linguistic or pre-representational:

Affect is an impingement or extrusion of a momentary or sometimes more sustained state of relation as well as the passage (and the duration of passage) of forces or intensities. That is, affect is found in those intensities that pass body to body (human, nonhuman, part-body, and otherwise), in those resonances that circulate about, between, and sometimes stick to bodies and worlds, and in the very passages or variations between these intensities and resonances themselves. (Gregg and Seigworth 2010, 1)

As an in-between, as forces or intensity, affect has an operational character in the composition of the relation between organisms and their environment. The body in affect studies can be seen as a "nexus of finely interlaced force fields," (Highmore 2010, 119) rather than a closed system. As such, affect enables us to engage with the world in ever new ways (Gregg and Seigworth 2010, 2).

Ultimately, this emphasis on affective relations with the environment comes with a challenge for our understanding of subjectivity. If we engage with the world because of the capacity to be affected by it, and to affect it reciprocally, how do we move from the basic affect to the assessment of meaning of that affect? How can we understand if a sensorial experience or feeling caused by an affective relation with the world is signaling, for example, threat or promise (Gregg and Seigworth 2010, 10)? How can we develop a form of critique of affects, and address the necessary concerns related to them? My exploration of metabolic processes, and how we can come to have an aesthetic experience of them, can contribute to these questions. Insofar as the aesthetic perspective that I propose here understands phases of pre-reflective experience as inherently meaningful and meaning-producing, we come to see that, even though the periphery of our conscious awareness is not penetrated by

reason, it is not without rationality either. As philosopher Susanne Langer puts it in her description of what she called *non-discursive symbolism*: Such a symbolism of light and color, or of tone, is in itself perfectly rational, but not to be conceived through language. This symbolism is found in a dimension of rationality that forgoes language. It can be read by the mind “in a flash”; it “preserves in a disposition or an attitude” (Langer 1951, 79). Rationality, and ultimately meaning, as Langer continues, have to be redefined¹ in order to understand that “[r]ationality ... is embodied in every mental act” (1951, 80). The subject that emerges from the pre-reflective relation with the world, from the attunement to metabolic processes, will be described briefly in the next section. A detailed account will then be given in the following chapters.

Metabolic Subjectivity

The subject of experience as I want to describe it here must be understood as dynamic, as arising from the constant re-establishment of a meaningful relationship with the world. It is sensitive to the interrelations between bodies, between bodies and environment on the metabolic level, and the possibilities for engagement that come with them. Like feminist scholar of science and technology studies Donna Haraway, I am interested in the assemblages and interrelations that come into view as soon as we shift our perspective in this way. These assemblages can reveal new meaning for the concepts we use to regulate our relationship to the world. What comes into view are:

... symbiotic assemblages, at whatever scale of space or time, which are more like knots of diverse intra-active relatings in dynamic complex systems, than like the entities of a biology made up of preexisting bounded units (genes, cells, organisms, etc.) in interactions that can only be conceived as competitive or cooperative ... [A]ll of the players are symbionts to each other, in diverse kinds of relationalities and with varying degrees of openness to attachments and assemblages ... (Haraway 2016, 60)

In this text, I follow Haraway’s notion of intra-active relatings, in order to understand how we can attune to climatic and metabolic processes and become more aware of the ways they impact the relation to our surroundings. Therefore, by relation, I mean various interrelated dimensions of experience: the relations of our biological body and its surroundings, which are established, for example, through the process of breathing; the relations of our sense of self and its surroundings, which are characterized by memories, thoughts, and feelings; and the relations established between the social subject and its surroundings, characterized by our habits. In accounting for the

1 N. Katherine Hayles (2017) proposes another great argument to re-think cognition and thus rationality in approaching what she calls the “cognitive non-conscious.”

bodily experience of biochemically and thermoregulatory interrelations with metabolic systems, our corporeality can come to the fore as a sensitive and productive force on the bio-chemical level—and thereby allows us to consider the bio-chemical dimension of our being itself as co-creating the context of our conscious experience. This perspective on the human subject is further inspired by anthropologist Samantha Frost's concept of *biocultural creature* (2016). This concept allows to take both bio-chemical and cognitive processes into account as they shape the way we interrelate with our environment.

Aesthetics of Metabolism and New Forms of Knowledge

The other forms of knowledge that I want to strengthen throughout this text are embodied, intuitive forms of knowledge—a knowledge of experience that is enabled through attention towards *how* we experience and not towards the *what*, the object of experience. Intuitive knowledge can, thinking along with Whitehead, be understood as something between physical and conscious purposes. Whitehead re-thought Henry Bergson's notion of pure and instinctive intuition as intuitive or propositional feelings, as “lures for feelings,” that “give to feelings a definiteness of enjoyment and purpose which is absent in the blank evaluation of physical feeling into physical purpose” ([1929] 1985, 280). Intuitive feelings can be understood, then, as an orienting principle, something that directs my attentions towards the world. It is in this phase of experience that I intuitively direct myself towards certain aspects in the world, and that creativity has its roots as the possibility for novelty, which lies in the fact that a subject integrates a new aspect into the process of its becoming.

The key argument I develop throughout this text is that we can gain a new perspective on the human-environment relations if we become familiar with the metabolic processes that embed us in the environment. Such a perspective would account for processes not fully comprehensible to our conscious reference to the world and can, in principle, emerge anytime. Therefore, while aesthetic milieus intensify experiences of metabolic processes, a sensitivity towards the effects of metabolic interrelations on our feelings, moods, thoughts, and actions can, in principle, happen at any point in time. This everydayness of aesthetic experience of metabolic processes can be exemplified with breathing.

Breathing is a vital example of an engagement with the world that can come to conscious experience anytime. As philosopher Emanuele Coccia points out, in breathing, our being as being immersed in a world becomes apparent, as “[w]e are in something with the same intensity and same force as that something is in us. It is the reciprocity of inherence that makes breath an inescapable condition: it is impossible to liberate oneself from the environment in which

one is immersed, and it is impossible to purify this environment of our presence" (2019, 143). Breathing traverses different levels, from the bio-chemical to the cognitive. In breathing, we are related to our surroundings in many ways: Oxygen provides energy, while possible pollutants can harm us; the chemical mix also primes how energetic we feel, how much energy can be provided for our muscle activity. Breathing exercises are used to reduce stress and calm the mind. If we learn to consciously breathe, to focus on our breathing in challenging moments or meditation, we shift our perspective to something that happens continuously. Exercising this shift is usually a temporary matter. We focus on breathing for a few minutes or an hour and then completely forget about our breathing, letting it phase back again into the background of our experience.

While we can become more sensitive towards the way we breathe and the effects our breathing has on our wellbeing, it seems more difficult to abstract knowledge from breathing about what it is that we are actually breathing in and out. The air we are breathing remains invisible, opaque. We grow used to certain chemical compounds in the air. Living day-in, day-out in a polluted city, for example, makes one unaware of the impact it has on the whole of one's being. This impact, as studies on one of the world's most polluted cities, Beijing, China, have shown, comes with severe physical and mental health problems (Liu, Xu, and Yang 2018).

Are the alarming effects that reports on these issues have on citizens and politicians around the world enough to create a change in perspective and habits, and they can lead to new ways of dealing with the fact that the biospheric metabolism traverses different scales of time and space, ignoring national boundaries? I argue that the shift in perspective that pays attention to the minimal-affective qualities of our atmospheric surroundings has to be exercised, and the mode of attending to one's environment must change, in order to give way to new ways of relating to the environment in a caring and less "ego-centric" manner. With an aesthetics of metabolism, I propose an aesthetics that foregrounds the intensities that come with transitions and phase-changes rather than discrete objects and that assigns new meaning to relational processes that embed us in our environment. Developing a sense of our bodily witness in the world beyond what is consciously graspable might ultimately extend our sensitivity beyond a human-centered point of view. This is because sensations that are not linked to an intention or representational system, and that must be placed beyond the position of the self-identical subject, start to matter. Furthermore, an aesthetics of metabolism creates a new context for everyday experiences. The metabolic interrelations that have been expressed through different modes of perception in the pieces explored here are always present in certain ways and not specific to the artistic works. An aesthetics of metabolism thus provides a certain orientation to the world, a

new perspective that is open to affective processes that transgress bodily and temporal boundaries. I propose understanding this orientation as a practice of re-imagining our relation to the world based on a foundational interrelatedness through shared metabolic pathways.

As a practical aesthetics of everyday experiences, an aesthetics of metabolism is informed by and derived in this way from real-world encounters (Bennett 2012, 2). As philosopher Jane Bennett puts it,

practical aesthetics is the study of art as a) means of apprehending the world via sense-based and affective processes—processes that touch bodies intimately and directly but that also underpin the emotions, sentiments and passions of public life. It is, then, the study of aesthetic perception at work in a social field. (2012, 43)

The interoceptive awareness for breathing, the emergence and unfolding of emotional processes and one's physical condition, a sensitivity to infrastructural processes of inscription of individual and collective actions, and the simultaneity and comprehensiveness of not necessarily visible environmental dependencies allow us to rethink the role that subjective, lived experience can play today. Not as an alternative to representations and abstract thought, but as an additional point of view, able to fill in the space between subjective experience and the effects of imperceptible phenomena in order to create a basis for reflection and communication of what tends to escape our conscious awareness. An aesthetic experience of metabolic processes can blur the object-subject distinction, and yet allow for the emergence of forms, feelings, patterns, and, ultimately, new concepts. Aesthetic experience, thus, is not radically opposed to reflective experience. Rather, both forms are only two modes of how we access the world—two of many dimensions of experience that prime each other and traverse each other.

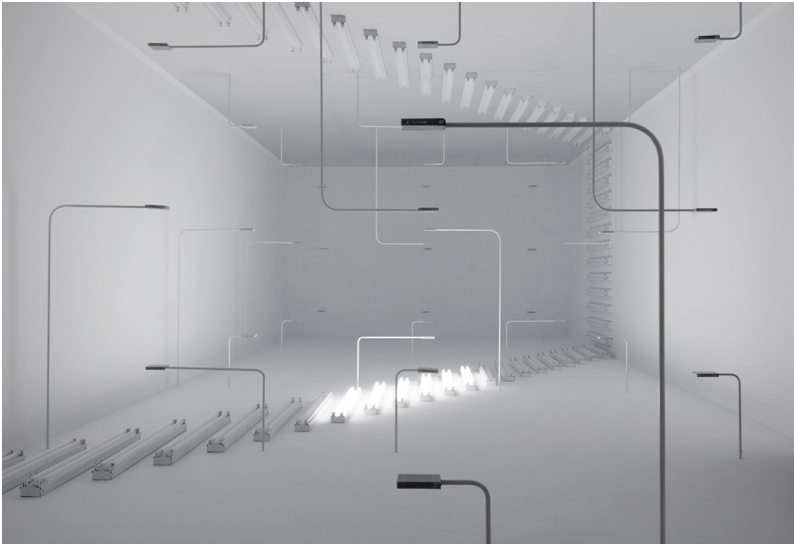
The Lived Body in Changing Climates

Interior Weather: The Sensing Body in Air Design

Air conditioning was invented at the beginning of the 20th century—at first, not to provide a comfortable atmosphere at home or the work place. The invention of air conditioning came with another technological innovation: color printing. Because humidity levels in the printing factories were too high for the printing companies to produce high quality color prints, an investigation into the reduction of humidity begun. The engineer Willis Carrier invented the first tool to cool air by circulating it over chilled coils. This way, humidity could be maintained at a constant 55%. In the years to follow, air conditioning systems were produced for implementation in other factories as well, such as flour mills. Air conditioners only found their ways into the living spaces of humans in the early 1920s.

The history of air conditioning is closely linked to technological progress. Supercomputers and thus global digitalization would be unthinkable without air conditioning systems. The same is true for the existence of high-rise buildings. One could say that air conditioning has contributed to the emergence and definition of *comfort*. Today, temperature and humidity levels determine our sense of well-being. Air conditioning also greatly contributes to energy consumption. Air conditioning in high-rise buildings in the United States, for example, makes up half of the total energy consumption. Air conditioning systems are linked to high CO₂ emissions and play a decisive role in the climate crisis. Architects like Philippe Rahm want to utilize the societal effect of air conditioning systems—the sense of comfort—in order to build more sustainable housing. Rahm studies the interaction of thermal processes in space together with subjective feelings and behavior. For his design, he

utilizes simple thermodynamic laws. One example of this is the subject of this following section: *Interior Weather*.



[Figure 1] Philippe Rahm Architects, *Interior Weather*, Centre Canadien d'Architecture / Canadian Centre for Architecture, Montréal, 2006. Photo: Michel Legendre (source: Philippe Rahm Architects).

The installation depicted in figure one was first presented at the Canadian Centre for Architecture in 2006. It contained two spaces with distinct purposes. One was subject to different climatic conditions, composed of light, temperature, and humidity, while the other space was equipped with controls and measuring devices. As Rahm explicates on his website, one aim behind the installation was to test if different climatic conditions could be used to design the function of a space. In applying meteorological parameters in this way to indoor space, the title rightfully suggests an internalization of the outside world in the form of weather in the interior of the human habitat.

According to the architect's website, temperature variations in this piece are meant to determine clothing ("Naked at 28° C, light clothing at 23° C, and outdoor wear at 16° C"). Variations of light intensity, on the other hand, are understood as the "verbs" that "animate the subject." Lastly, humidity levels act as a supporting element of the relation between climatic conditions and human subject. In this way, a usage of space is suggested that adapts to the various indoor climates and thereby reduces energy consumption.

I understand the installation as an experimental environment that allows one to formulate novel questions and to develop architectural practices as a response. However, the suggested formula cannot easily be transferred to the lifeworld in this way, as it isolates the different modes through which the

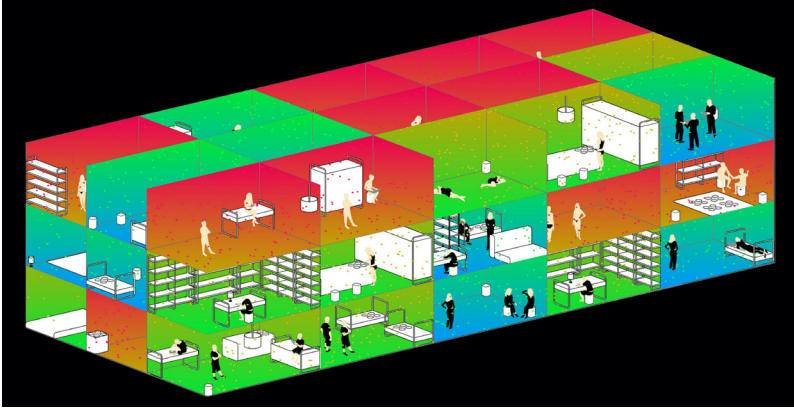
human subject relates to their environment. But if we consider the effects of temperature, light, and humidity on human action as interrelated, then the experiment can be used to investigate these transitional phases. What therefore interests me in the following is the question of how *Interior Weather* enables one to parse the processes of interrelating between bodies and climatic conditions that potentially lead to an aesthetic experience.

Part of the installation was a range of illustrations that were models of the implementation of climatic conditions in indoor design, which suggested different atmospheres for each room and intended usage. Next to the sketches, a text by French writer and filmmaker Alain Robbe-Grillet was displayed, listing variations of light intensity, relative humidity, temperature, and—possibly his own—emotional response and behavioral effect of these conditions: “Relative humidity 50 percent. Temperature 21 degrees Celsius. Light Intensity 750 LUX. A cubical. No door, no window. Outstretching and resting. Recovery? Relative humidity 98 percent. Temperature 28 degrees Celsius. Light Intensity 750 LUX. Icy air. Growing warmth. Disorientation” (CCA 2019). The assemblage of architectural models, subjective narrative, and experiential space suggests a map of the interrelations between the meteorological and the human condition in relating subjective experience and its poetic expression with the seizing of a space through climatic processes. This approach to spatial design that follows the exploration of the meteorological conditions of a site, and their impacts on feeling and behavior, is particular to Rahm’s practice. With this work, the Paris-based architect proposes re-thinking space and using the characteristics and qualities of air:

Normally, the architect organises his plan to suit the proposed functions of a space and introduces a ventilation system only later. I asked myself if it might be possible to reverse this proposition, in such a way that form and function would follow the climate. In consequence, spaces would no longer be organised in accordance with functional principles but in terms of ventilation. The house would literally be designed on a current of air, going from dry to humid. (Stalder and Rahm 2010, 91)

Designing a house on a current of air means using the processuality and gradual difference of an environmental medium to condition human experience. How and what we perceive and how we navigate this particular space is mapped onto the qualities of air flow specific to the location. Having form and function follow climate, Rahm develops a different notion of the organization of space—away from the categorical idea of *bed-room*, *bath-room*, and so on, towards objects organized in space according to an invisible structure: The bedroom is no longer one room next to other rooms. Rather, it is a spatial arrangement of the bed according to natural convection. The bed could thus end up being positioned at a higher altitude, under the roof, for example, to benefit from the warm air moving upwards. The indoor space as Rahm

re-thinks it provides different temperatures for each functional area without the need for doors or walls.



[Figure 2] Philippe Rahm Architects, Interior Weather, Centre Canadien d'Architecture / Canadian Centre for Architecture, Montréal, 2006. Photo: Michel Legendre (source: Philippe Rahm Architects).

As shown in figure two Rahm applies these design patterns distinctively to minimize energy consumption: a “room” in which I tend to wear casual clothing, such as the bedroom, is therefore positioned in an area that is relatively warm according to the air flow throughout the space and thus needs no additional heating. In varying the different parameters of humidity, temperature, and light intensity, Rahm thus suggests on his website “an infinite number of possible interior weather situations. Temperature variations define what degree of clothing is appropriate, for example naked at 28° C, light clothing at 23° C, and outdoor wear at 16° C, and thus define the subject.” In this way, Rahm re-thinks not only spatial concepts, but also the way we inhabit space, and how this way impacts the subjects that inhabit the space according to the “weather situations.” The idea of the autonomous human subject is thereby challenged. The question is not which layout would confirm current design standards of pleasure or ideas of “feel-good atmosphere.” Instead, by starting with physical laws to design a spatial layout and therefore the usage of the space, he suggests new forms of life, emerging from atmospheric relations between the human and environment.

In this chapter, I will consider the question of agency as it arises when the way we inhabit the world is related to the engagement of the sensual body with that world, instead of conscious decision-making. I will explore two works by Rahm regarding their metabolic aesthetic, and how the modes of perception particular to such an aesthetic shift the perspective towards novel engagements with the environment, which are not based on conscious

decision-making alone. Ultimately, I will suggest how the two aesthetic milieus express what I call here an *aesthetics of metabolism*.

Rahm himself does not reflect the question of agency in his design explicitly. But reading through his project descriptions, the question arises, how would it feel to live in a house in which different micro-climates urge a certain behavior, such as different clothing or actions like sleep and showering, due to objective standards that target the biological dimension of our bodies instead of personal taste? The question also relates to the overarching question of how, in the face of the climate crisis, a global change in human behavior and the restructuring of economic and political systems can be achieved.

There is an interesting twist in the first question: Usually, we seem to believe that the common style of interior design matches our desires. Despite small variations, a house usually consists of at least a kitchen, bathroom, and bedroom divided by walls, and each of these rooms is equipped with the predictable furniture. Not questioning this basic structure, our understanding of indoor design is usually limited to the model of furniture or the color of the walls, and these decisions are considered to follow individual taste. The interior of our homes usually represents in this way the extent to which humans have altered their environment. Controlling the climate is the culmination of this process of appropriation. In Rahm's vision, this relationship is partially reversed. The thermodynamics of a place are analyzed and the interior designed to amplify their effects on bodies, to thereby minimize additional air conditioning, whether it be cooling or heating. In targeting the body instead of an individual's aesthetic judgement, does such a design strategy undermine the inhabitants' free will? If what we feel and how we act is due to the rationale of a design, it would seem we depend on the decisions the architect makes for us. But is our culturally grown idea of the spatial layout of our living spaces more authentic than a spatial design that is determined by atmospheric affects? Do we have a higher degree of "free will" in the first case than in the second?

One quality of a metabolic aesthetic is to bring to the foreground of our awareness our pre-reflective, bodily engagement with the world. In experiencing aesthetic milieus that intentionally intensify metabolic processes in order to suggest certain behavior, we might come to realize how big the impact of our bio-chemical dimension is on our so-called "higher cognitive" capacities. Thereby, I suggest, we come to re-evaluate the role our conscious awareness plays in our day-to-day decision-making in the first place. A metabolic aesthetic can thereby contribute to the discourse around the weight of human cognition and agency. There are many reasons and perspectives from which one can challenge notions of free will and the authenticity of the conscious subject. One way is in noting that consciousness can be understood as a spectrum that runs through all the biology of life and is not a feature

distinct to human higher cognitive processes (Hayles 2017, 5). Another is in not just explicating aesthetics as the evaluation of an object, but also expanding aesthetic perception towards sensual experiences, to include transformative processes internal and external to our bodies.

Relating this back to my hike in Thailand, my experience of the changed atmospheric condition in the air pocket encompassed different senses: the temperature and humidity sensed through my skin, the change in hue and colors around me, my physical response to the higher concentration of oxygen in the air. These transformations and transformative processes internal and external to my body could not be sharply separated. I see this interpenetration of the bio-chemical dimension of bodies and their atmospheric surroundings at the center of Rahm's design. Rahm's work opens for my explication of that aesthetic an experiential space and helps me to explore in particular the pre-reflective realm of our being and how it generates meaning from sensual qualities. What interests me in particular are the processes in between the sensing of warm and humid conditions and the behavior and clothing this experience generates according to Rahm. In building upon the thermo-regulatory capacity of bodies and how it is through that capacity that we are alive, in this world, and in a particular space after all, I understand his work as an engagement with spatial relationships that allows one to think about the body as being coupled with consciousness and world, without a fixed hierarchy.

As the body in Rahm's design incorporates and responds to climatic conditions of a space, the inseparability of body and environment becomes obvious. The sensations that emerge from these engagements will be described further with Merleau-Ponty's phenomenology of the "lived body," which he first developed in the 1940s. According to it, the lived body presents us with a "chiasm" of the body (1968): As such, my body is at once my sensing body, directed towards the world, and the object of my conscious reference in its sensing. The lived body as the body experienced by a subject as that subject's body functions as an anchor point: As the body in its ability to sense and cope with climatic changes comes to conscious awareness, it can induce new scopes for action. One of those new scopes for action is to physically exercise in a space that is cooler or to open a window if the oxygen inside a room is used up. These actions—relocating physical activities that make the body produce heat to cooler areas of one's home or changing air ventilation—seem to make intuitive sense. That is, in part, because they follow from the way our bodies navigate the world in what Merleau-Ponty called "operative intentionality" ([1945] 2012, 19)—the pre-reflective directedness of the body towards the phenomenal field, which is, according to him, always already full of meaning. I will use this "operative intentionality" of the body to relate an aesthetics of

metabolism to a form of knowledge that helps to re-situate human agency apart from conscious reference to the world.

The particular medium with which the body engages here in its operative intentionality is air. Air plays a central role in Rahm's work. To work out the meaning of this atmospheric medium for my investigation, I will contextualize Rahm's practice within the aesthetic tradition of our relation to air—from being understood as the essence of all life to an invisible latent danger, something to be regulated in indoor spaces, and, finally, an ontological condition of all things. This ontological condition is complicated due to air's ephemerality, which will be examined more closely regarding the potential of its withdrawal from human access using concepts by philosophers Martin Heidegger and Luce Irigaray. Following from that, I will flesh out the role the metabolic dimension plays for an emergent subjectivity as it registers atmospheric processes that penetrate bodily boundaries and draws into question the dichotomy of bodies and environment. This will lead me to the question of what those modes of experience are that seem able to sense the effects of atmospheric processes on our body and ultimately our sense of self. How can the suggested processuality between body and space become part of an aesthetic experience? Lastly, I will examine if an implementation of minimal-affective qualities of atmospheres in everyday environments could lead to a higher sensitivity to ecological processes and open up new scopes for action. Is a design idea like Rahm's a chance to expand our sensibility, or does it instead fall into the category of nudging?¹

Mediality of Air

The Explication of Air

Air as a medium is itself invisible; it carries certain effects that can become sensually experienced, through our skin, smell, hearing, or breathing. While being a medium, air is also part of the atmosphere, of the climate surrounding us. The atmosphere is part of the larger environment that we share with other entities. Changes in the atmosphere usually cannot be perceived immediately. Yet, they impact our surroundings and thereby our everyday lives in a fundamental way. Emanuele Coccia designates this sphere that we cannot access with our senses as the foundation of what he calls "human sphere":

The human sphere—culture, history, the life of the mind—is not autonomous, it has a foundation in what is not human; the apparently nonspiritual elements—air, water, light, winds—do not engender mind but can influence the human being, his or her behaviors, attitudes, and ideas.

1 *Nudging* is a concept in behavioral science, political theory, and behavioral economics that proposes positive reinforcement and indirect suggestions as ways to influence the behavior and decision-making of groups or individuals (Independent 2017).

Climates engender and set up the majority of humans in their physical aspect and, even more, in their social mores. (2019, 131)

Here, Coccia draws upon the reciprocity of body and mind, stating that changes in the environment impact not only human bodies but also how they act in those environments and their constructions of abstract ideas about them. His position aligns in this point with Merleau-Ponty's phenomenology and current theories of embodiment, such as enactivism, which seek alternatives to cartesian dualism. For Coccia, air functions as that medium that allows us to experience the embeddedness in the world through breathing: "To breathe means to be immersed in a medium that penetrates us with the same intensity as we penetrate it" (2019, 29). Coccia re-contextualizes air in this way as an environmental medium that no longer possesses spiritual qualities, but that, as a medium, embeds us in the world through the act of breathing, parallel to the scientific explication of air.

Today, we know that air, or, more precisely, oxygen, enabled the possibility of complex life developing on Earth. Some 2.7 billion years ago, photosynthetic microbes started to produce oxygen that changed the planet radically, giving birth to the ozone layer and to a more constant atmosphere on Earth. Only in the 18th century did scientists find that air was not empty, that space was composed of gases and different matters (Johnson 2009, 122). Since then, air has been shown to be composed of bacterial life, electronic waves, and pollution.

The history of the knowledge of air is a story of an elusive medium that is vital to humans, but at the same time increasingly fraught with danger: During World War I, air was discovered as a possible weapon. While being the medium we are embedded in, it is also a material that can be altered—used as a carrier for poisonous substances in chemical warfare, for example. As philosopher Peter Sloterdijk points out, with the gas attacks of World War I, the target moved from the enemy's body towards its environment, turning it into an unlivable space. With these new dimensions of the significance of air being unpacked, a certain naive ignorance of the air, which Sloterdijk insinuates, has been increasingly replaced with concern (2009, 50). The increased awareness of what the invisible air we breathe is composed of and the urgency connected to this—through its instrumentalization in military practice as well as its increasing air pollution due to industrialization—leads to, according to Sloterdijk, a latency of air that establishes a feeling of uncanniness. This uncanniness, in Sloterdijk's reference to Martin Heidegger, puts our "home-land" (*Heimat*), our feeling-at-home in a place, in danger:

Having become aware of the primary and secondary greenhouse effects, living and breathing under open skies can no longer hold the same meaning as before. From the open-air homeland that mortals have had

since time eternity, something uncanny, uninhabitable, unbreathable was withdrawn. Ever since Pasteur and Koch discovered the existence of microbes and had it established in scientific publications, human existence has had to be prepared to take explicit measures for symbiosis with the invisible—and all the more so to prevent and defend itself against microbiotic competitors that have now been identified with precision. As of the 1915 German gas attacks and their allied retaliations, the air totally lost its innocence. (2009, 109)

Once again, the joint development of knowledge about air and technological innovation can be noted. After air was deployed as a medium for chemical attacks, technologies for monitoring the air and defense against approaching threats developed as well. In addition to these developments in the military sector, knowledge about changes in air composition and the increasing awareness that air can be unhealthy for humans has led to an increased development of air conditioning systems. New ways of measuring, preparing, and representing air in this way gave rise to design strategies that condition air for predetermined purposes.

Architecture as the field that manages what Sloterdijk has called the “symbiosis with the invisible” is at the forefront of air design. Air design in architecture takes into account how, for example, oxygen levels impact our moods and actions, as can be seen in a phenomenon that is referred to as “casino air.” As the urban online dictionary states, the notion of “casino air” points towards the assumption that casinos intentionally increase the amount of oxygen in the air in order to afford longer concentration periods. The myth that some hotels in Las Vegas used to pump extra oxygen into their casinos to keep people awake might be false, but it still holds true that temperatures in casinos are lowered and flashing lights installed, which might have the effect that visitors stay awake longer and feel stimulated. Particular air conditioning systems for casinos additionally purify the air and thus increase the amount of oxygen—even if in the form of subtraction of other particles and not through addition of oxygen per se. The gambling industry would be an interesting example for the ways atmospheric media are used to “nudge,” to influence people’s behavior and decision-making. In her book *Addiction by Design: Machine Gambling in Las Vegas* (2014), Natasha Dow Schüll provides an interesting analysis of this phenomenon using the example of the gambling industry.

Air design is also a crucial element in what is being called the *atmospheric turn* in architecture (Vignjević 2017). What is idiosyncratic about this turn is that it doesn’t stop at the mere regulation of air, which has been part of the design of indoor spaces since the beginning of the 20th century. Rather, it seems to re-instantiate an understanding of the human as a “dweller,” as a being that inhabits a world with sensual, emotional, and cognitive dimensions

of experience. The goal in this context is thus less to create a stable indoor climate than to involve the body and its senses in the experience of the space. According to architect Juhani Pallasmaa, “[s]ignificant architecture makes us experience ourselves as complete embodied and spiritual beings” (2005, 11).

The turn towards invisible material flows in architectural design has produced a growing number of works as well as theoretic publications over the past 20 years (Zumthor 2006; Pallasmaa 2014). Architects such as Peter Zumthor, Juhani Pallasmaa, Herzog & de Meuron, C+arquitectos, AMIDcerog, R&Sie(N), Philippe Rahm, and Mark Wigley attach new meaning to atmospheric processes and draw new relational dependencies between them and the construction of living spaces that include the human in their corpomateriality, which itself is being embedded in these interdependencies. These newly considered relations between the human and their environment relate, at least in part, to the ecological crisis we are facing today. What has been called the era of the human—the Anthropocene—surfaces how deeply human actions have altered the planet. The atmospheric turn in architecture considers the other side of this dynamic: how the atmosphere that has been altered by the human species effects our bodies, emotions, and actions in return. It takes into account that the border between the human habitat and the outer environment is not that clear anymore. The effects of global warming and industrialization, such as increased pollution, stand in stark contrast to the idea of the home as a shelter from any unwanted external impacts. Excluded materials and processes such as waste, pollution, or extreme weather conditions tend to push back into our everyday life. They end up in our bloodstream as plastic particles, while the particles that pollute the air of seemingly distant countries reappear in our own skies, and heavy rainfalls flood our streets and basements. Walls cannot shelter us from the tiny particles ingested from polluted air, which today are considered the largest global threat to life (Worldwatch 2019). This leads to a re-contextualization of the role of architecture as well.

Part of the atmospheric turn in Architecture is the urge to take into consideration changing climates and their unpredictable consequences. Architecture as the construction of spaces for human inhabitation defines then a contact zone between humans and their environments instead of clear boundaries. Architecture becomes the theory and practice in which individual everyday life meets global crisis. In this sense, according to Juhani Pallasmaa,

architecture calls for a deepened sense of materiality, gravity and reality, not an air of entertainment or fantasy. The power of architecture is in its ability to strengthen the experience of the real, and even its imaginative dimension arises from this strengthened and re-sensitized sense of reality. (2014, 240)

In taking serious the refusal of the distinction between the climate as a non-human sphere and the human sphere of culture, society, and technology, air design in the atmospheric turn moves from epistemological measures and representations of air towards its performativity and affectivity: Because atmospheres not only have a materiality that comes with idiosyncratic effects on our bodies, but also impact our feelings and moods, the deepened sense of reality Pallasmaa is speaking about concerns especially the pre-conscious dimension of our involvement with the world:

The all-encompassing and instantaneous perception of atmospheres calls for a specific manner of perception—unconscious and unfocused peripheral perception. This fragmented perception of the world is actually our normal reality, although we believe that we perceive everything with precision. Our image of our world of perceptual fragments is held together by constant active scanning by the senses, movement and a creative fusion and interpretation of these inherently dissociated percepts through memory. (2014, 243)

In exploring the “dialectic tension between the physical and the immaterial,” (Pallasmaa 2014, 243) the atmospheric approach in architecture challenges, yet again, and from a different angle than that brought forward by famous fore-runners like architect Buckminster Fuller in the first half of the 19th century, how we understand our relation to the environment. Put into practice, as Rahm formulates it, architecture must consider two orders of magnitude:

At the large scale, meteorological architecture explores the atmospheric and poetic potential of new construction techniques for ventilation, heating, dual-flow air renewal and insulation. At the microscopic level, it plumbs novel domains of perception through skin contact, smell and hormones. (Filipendin 2014, 4)

For Rahm, representational measures cannot bridge these scales. Numerical data that represent climatic processes are thus not implemented in the home to provide a visual link between climate and subject. Numerical data only informs the design process by providing orientation; the main focus lies on homeostatic processes and how the body participates in them. As such, Rahm’s practice draws consequences from the discrepancy between numerical or graphical representations of climatic processes and how we experience them sensually and emotionally:

Climate change is forcing us to rethink architecture radically, to shift our focus away from a purely visual and functional approach towards one that is more sensitive, more attentive to the invisible, climate-related aspects of space. Slipping from the solid to the void, from the visible to the invisible, from metric composition to thermal composition, architecture as meteorology opens up additional, more sensual, more variable

dimensions in which limits fade away and solids evaporate. (Filipendin 2014, 7)

In using mainly invisible phenomena and structuring the space according to their effects on bodies and other materials, Rahm explicates the mediality of atmospheric media such as air: What becomes explicit are the invisible forces behind the forms, the effects air as a medium has, and not so much the formations themselves. The effects of these forces on the sensual apparatus will therefore play a central role in my investigation of a metabolic aesthetic.

To conclude this section, the explication of air can now be seen as having troubled the relationship between human and environment. The atmospheric turn in architecture proposes a design that restructures this relation by considering the modes of perception and sensation enabled by the effects of invisible atmospheric processes. In order to evaluate these modes of perception as they arise in Rahm's work, I will return briefly to the question of agency as it is projected onto the human subject facing an increasingly complicated relation to the world, and how an explication of the metabolic inter-relations between human and environment can re-situate human agency.

The Latency of Air: On the Uncanniness of Atmospheric Milieus

The question of where to place agency in climatic conditioned spaces relates again to the mind-body problem that philosophy and more recent disciplines such as the cognitive sciences have been dealing with since the rise of cartesian philosophy. If agency is identified with human cognition, which grounds assumptions of human superiority and the consequential presupposition that mind, body, and environment are separated, then a meteorological architecture like Rahm's can only serve to optimize the environmental conditions to support human cognitive capacities. The question of agency comes, then, with that of power and, more precisely in relation to the atmosphere, with that of access. Rahm, however, explicates access to atmospheric processes and their effects on the body, while, at the same time, discussing how these effects have an impact on our thinking and acting. The separation of body and mind is thereby questioned.

Thus, Rahm's work not only touches on the subject of embodiment theories, but also points out connections to political theories. In this context, Jennifer Gabrys' work on participatory agency as embedded in smart city developments gives an interesting perspective on Rahm's architectural visions. In Gabrys' sense, "participatory agency does not settle on an individual human subject, and citizenship"; instead, it is "articulated through environmental operations" (2016, 200). Human agency develops and is expressed, then,

through an extension towards atmospheric processes and articulations. In contrast to the smart city subject stand those communities where the impact of climate change is already showing its devastating effects. Here, technological regulation is concerned with managing the life-threatening effects of air pollution, forest fires, and persistent drought instead of optimizing well-being or working conditions. What can be concluded is that we cannot do anything other than be in the air, and being in the air does not mean the same thing for everyone. If air design operates at the threshold of representability, the question of access to knowledge about air quality and about the ways its effects register in our environments and bodies becomes central. The air design of living spaces, of habitats for dwelling, becomes especially relevant if we keep in mind this bio-political dimension of *being-in-the-air*: Air design not only concerns the representation and transformation of air—it impacts explicitly and implicitly possible ways of life, makes space breathable and livable, and thereby also determines which spaces and related possibilities are accessible to whom (Abram, 2018).

The explication of the latency of air that has led to the increased management of climate could lead to different interpretations: to a new awareness of ecological interdependencies, as Rahm's aesthetic practice seems to drive towards, or to an increased utilization of atmospheric qualities, to re-embed the human in the atmosphere. If the border between changing climates and their effects on our atmosphere becomes porous, our whole being is put at stake, as well as our physical and mental health and the future of life on earth. The feeling of helplessness that inevitably comes with these processes raises the question of the possibility and significance of individual agency and responsibility. And inseparable from it is the question of how we are able to deal with insecurities. How does Rahm's practice relate to contemporary approaches in the humanities that investigate the relation between the human and its environment in times of climate crisis?

One position that highlights the insecurity that comes with the latency of atmospheric processes is formulated by environmental philosopher Timothy Morton. He terms processes and things on scales that are beyond human comprehension as "hyperobjects." According to Morton, taking the existence and impact of such objects into account does not mean that we regain intimacy with and knowledge of the world. The opposite seems to be the case: As Morton states, planetary awareness does not increase the understanding that *we are the world*—rather, it makes apparent that *we aren't* (2013, 99). This is because, according to Morton, the environmental crisis comes with a disruption of human self-understanding. This not-being-the-world that Morton implies stands opposite to interrelational views offered by other contemporary perspectives.

The human in Morton's view is disconnected from nature due to this estrangement. Without referring back to ideological notions of human and nature forming an initial wholeness, other theories do not place alienation between the human and nature, but instead see the strange, the alien, the inhuman, as part of nature, and the human as being part of nature as well. Sociologist of science Bruno Latour, for example, offers a figure to think of nature as a whole without ignoring the strange and uncontrollable as being part of it. His concept of Gaia, which he based on Lynn Margulis' and James Lovelock's work on this idea, describes a new figure for the Earth. Gaia is a "name proposed for all the intermingled and unpredictable consequences of the agents, each of which is pursuing its own interest" (Latour 2017, 142). Gaia is especially not a figure of unification; it does not offer a global perspective. Instead, Gaia may "reterrestrialize" our existence by emphasizing a partial view of the matters of the Earth instead of reinforcing a global one. Gaia refuses representation and objectification and therefore challenges us to turn towards those materials, organisms, and processes that play central roles in the mattering of Gaia and understanding Gaia as deeply processual itself. Gaia, therefore, is described by Latour as "an animated world, an Earth that vibrates underfoot, no recognizable landscape, no affirmed authority, frightful mixtures, a proliferation of hybrids, scattered members of sciences, industries, and technologies" (2017, 149).

The ephemerality of air, then, is not a reason for alienation but instead for a greater familiarization of what embeds us in the world, and it holds possibilities of further becoming. If we understand that the air's withdrawal from representation and conscious mind is fundamental to being, the acceptance of the ephemeral quality of air might lead to a more positive perspective. A perspective that I want to bring forward is that of metabolism. Air as a medium of this perspective allows us to acknowledge how animated and unanimated bodies are in constant exchange of energy and matter—across species-borders and across scales of time and space. Can we re-think being-in-the-world as being-in-the-air through metabolic interrelations? Can spaces as Rahm designs them lead to an increased sensitivity towards the invisible effects of air, and thus to a greater familiarity with atmospheric processes? To flesh out what such an approach might offer, an expansion of aesthetics towards the bio-chemical dimension of our being and the sensations emerging from there is needed. To answer these questions, we need to understand how air registers in space, which modes of perception are able to sense atmospheric changes, and ultimately, how they can become meaningful to a conscious subject.

The Sensing Body and Atmospheric Perception

The Body as a Transformative Medium

In order to flesh out the role the body plays in enabling the experience of climatic changes, in the following, I will utilize the notion of the “lived body” by Merleau-Ponty. The lived body was conceptualized by Merleau-Ponty as a transformative medium that interrelates subject and world. This relation was established for him by the body schema, which functions as a structuring force and is directed to the world in what Merleau-Ponty calls “operative intention.” This relation is to be understood as pre-cognitive, as it allows for the world to be structured in a meaningful way that only then can be grasped by a consciousness. Consciousness, as the subjective grasp of an objective reality, is thus understood as arising at a later stage. In this structuring, the sensory awareness of things external to our body and bodily awareness of our body itself are merged in such a way that a steady background is formed. Merleau-Ponty called this steady background the “perceptual field.” From this field, certain objects or characteristics are brought to the fore and become the meaningful object a subject refers to. Meaningful reference, therefore, is enabled by the body, being at the same time sensorially extended towards the world and sensual in itself. And perception—thus bound to the corporeality of the being—is only one mode of consciousness, which creates, communicates, and shares meaning.

If we relate this back to *Interior Weather*, it is not so much perception in the form of the visual sense that structures our being in that space. The climatic condition that forms the background of experience comes to the foreground through the effects on the body—we do not necessarily sense the temperature or the humidity in the room, but rather how our body copes with it. Confronted with warmer temperatures in certain areas, our bodies thus begin to biochemically regulate the energy uptake that would most likely be felt in certain ways, such as getting warm, or feeling sleepy and relaxed. In this case, neither the air nor the oxygen level would stand out for us, as we are unable to see it, but rather, the way our body expresses this relation. The perceptible qualities in the environment, which render an object perceivable in its being-so, move to the background, and the attention is re-directed to the bodily sensations that come with the experience of qualities that are not visible to the human eye: temperature or humidity, for example.

But in what way does this foregrounding of bodily sensations express meaning to be grasped by a subjective consciousness? Can those metabolic processes that underlie the bodily sensations in *Interior Weather* become aesthetic, meaning, can they afford the experience of distinctive qualities that becomes decisive in comprehending the situation? To answer these questions under consideration of the lived body as a structuring force, we first need to

understand better how Merleau-Ponty tried to avoid the subject-object binary while at the same time granting the possibility of an objective and shared reality. In his later writings, he tried to define mediations of meaning other than body and language. In moving beyond philosopher Edmund Husserl's thesis of the *subjective constitution of meaning*, Merleau-Ponty instead suggested speaking of the *institution of meaning*. Husserl spoke of the meaning of an object being constituted by a conscious subject, thereby placing the constitution of meaning solely in subjective experience. Merleau-Ponty instead placed emphasis with his term "institution" on the relationality of consciousness and object. In this sense, Merleau-Ponty wanted to acknowledge the intermediate zone of mediation, which, in his concept of the *flesh*, interrelates bodies and their environment, constituting them at once, without removing subjectivity: "Expression is always a sort of schema of the carnal other side of the flesh of the intersubjective world, exposed for the first time to the public eye as a visible trace of the indirect, symbolic texture of the invisible reality which constitutes it" (McCleary [1964] 1995, xxii). Bodily sensations that follow the climatic conditions in *Interior Weather* express in this way a metabolic interrelatedness of human subjects and their environments that can only become sensual in the form of a trace. Being a sensual trace, an expression cannot be conceived as a fixed state of a thing. As a trace, it refers to a before and an after of the moment that it becomes phenomenological. This momentariness of meaning constitution in expression, to me, points to a processuality that underlies all perceivable phenomena, and metabolic processes are taken as one example.

Following that, an aesthetic experience of metabolic processes would expose the relation between external climatic conditions and felt bodily response without suspending the processuality, the being-a-trace, in favor of the objectification of that relation. What comes together in such an understanding of aesthetic experience is the intuitive, embodied, and conceptual character of experience. By understanding *Interior Weather* as an aesthetic milieu in which the experience of being embedded in a spatial environment coincides with the awareness of this experience as a process, aesthetic experience can be understood here as going beyond internalized, purely phenomenological experience on the one hand and externalized, objectifying experience on the other.

The understanding of the aesthetic experience of metabolic processes within an aesthetic milieu offered here could then be read with philosophers Dewey and Merleau-Ponty as a moment in which an aesthetic experience stands out within a larger context of experience. Aesthetic experience would be only one possible manifestation of meaning in what can be further described as an unfolding of the "... symbolic texture of the invisible reality which constitutes it" (McCleary [1964] 1995, xxii). What grounds the relation of subject and environment in this understanding is the institution of meaning from

potentiality. This role of potentiality as part of meaning institution needs to be unpacked further. In each expression, a new dimension of the world opens up, a specific environment with its own range of possible appearances and actions (McCleary [1964] 1995, xxii). These expressions are not infinite, because the human subject suggested by Merleau-Ponty is situated in a historically finite system of instrumental and expressive capacities: “Human institution is still the integration of this past into a new signification ... it is the past becoming a symbolic matrix” (2003, 29). Subjectivity, then, is enabled by the coherent structuring of experiences offered by meaning institutions, a structure that connects past, present, and future.

This temporal structure of experience as it is explicated by Merleau-Ponty is central to understanding how metabolic processes can be experienced in an aesthetic way. Opposing the empirical and intellectualist notion of temporality, he offered an understanding of temporal experience as arising from the interactions between the body and its world. First, temporal experience in Merleau-Ponty’s work is extended; it extends into the “intersubjective world” that is the “other carnal side of the flesh” (McCleary [1964] 1995, xxii). Second, this intersubjective world, for Merleau-Ponty, stands as a realm in which the distinction between other, the not-me, and the me is momentarily lifted. This other, third, is not only the other I encounter in the form of a person or object, but also the other that is me—my body, for Merleau-Ponty, also always is an object in the world, always transcends itself, de-presences itself:

Whether it is a question of my body, the natural world, the past, birth or death, the question is always to know how I can be open to phenomena that transcend me and that, nevertheless, only exist to the extent that I take them up and live them, how the presence to myself (*Urpräsenz*) that defines me and that conditions every external presence is simultaneously a derepresentation (*Entgegenwärtigung*) and throws me outside of myself. ([1945] 2012, 381)

The opening towards alterity is fundamental to Merleau-Ponty’s philosophy, and, within my investigation, it allows me to locate the perspective of metabolism within the emergence of subjectivity from its ongoing inter-becoming with the world. Meaning is thus to be understood as emergent; it emerges from the ongoing engagement with the world, just as the subject that grasps this meaning.

In the following section, I want to explore if Merleau-Ponty’s concept of the temporal subject as arising from meaning-institution can give insight into a mode of experience in Rahm’s work that extends towards the bio-chemical dimension of our being. I will introduce a second installation by Rahm that shows how changes in atmospheric composition affect the human subject on

different bodily and cognitive layers and in different intensities. I will focus on the different modes of perception enabled by the intensification of certain sensations and how they might relate to a reconfiguration of the relation between the human subject and its environment.

Hormonorium and the Bio-chemical Dimension of Being

In using the affective qualities of temperature and humidity as they can be found at a site, Rahm's architecture reveals something about our being-in-the-world that usually does not concern us in our everyday life. Yet, it forms the background of our conscious experience. The way our mood and our actions are impacted by invisible meteorological forces shows how we are always already immersed in climatic environments. And this aspect of our being connects the bio-chemical dimension of our bodies with our emotions, moods, abstract thoughts, and social reality. What if the experience of this interconnection were to become explicit to a conscious subject? Would it enable new ways of relating to the bio-chemical dimension of our being? And what exactly is this dimension of our being? How can it be defined further? These questions will be explicated alongside a second work by Rahm, which he developed together with his partner at the time, Jean-Gilles Décosterd: *Hormonorium*.



[Figure 3] Décosterd & Rahm, *Hormonorium*, 8. Architecture Biennale of Venice, 2002. Photo: Jean-Michel Landecy (source: Philippe Rahm Architects).

Figure three shows *Hormonorium* as it was first exhibited at the 8th Venice Architecture Biennial in Italy, 2002. When visitors entered the room, they

seemed to step into a simple bright, white, empty space. But the invisible atmospheric conditions were manipulated in such a way that the visitors were to experience their impact after just a few minutes, as if they had been transferred into an alpine region. *Hormonorium* is a sensual space that shifts the attention away from the built environment to one's own body. Rahm and Décosterd used vapor, temperature, humidity, and light to compose an atmospheric continuum that would bring into focus the different modes of perception that register climatic changes and their impacts on experience.

As shown in figure four, the floor of the room was covered with transparent panels under which 528 fluorescent tubes were placed, emitting a white light that reproduced the solar spectrum (with UV-A and UV-B). The temperature was about 15–16° C (59–60° F), and the oxygen levels similar to areas at 3000 meters (9842 feet) altitude. As the artists explicate on their website, altitude sickness can be experienced at around 2000 meters (6561 feet), and symptoms can appear after a short time under these conditions, especially if there is no adaptation time given to the sudden exposure to such an atmosphere. Thus, depending on the duration of one's stay in the *Hormonorium*, the low oxygen levels might have manifested in the feeling of disorientation, headache, or even unreasonable behavior. The UV-A and UV-B rays could lead to the feeling of being more awake, or as far as euphoria and agitation. While *Interior Weather* suggested moving weather into the inside of our homes, *Hormonorium* moves even deeper: towards the metabolic dimension of our being.



[Figure 4] Décosterd & Rahm, *Hormonorium*, 8. Architecture Biennale of Venice, 2002. Photo: Jean-Michel Landecy (source: Philippe Rahm Architects).

In *Hormonorium*, the relation between environment and human subject is not defined by clear limits, but instead by intensities that stand out within a continuity between the living and non-living:

The *hormonorium* is a work on the disappearance of the physical limits between space and the organism revealed by biology and neuroscience. Going beyond visual or metric meditation, establishing a continuity between the living and the non-living, the *Hormonorium* opens to the invisible, to electromagnetic and biological determinations. Understanding of physio-chemical mechanisms governing organisms engenders a modification of the understanding of space and equally the understanding of our occupation of the environment. (Plewke and Rahm 2010)

This continuity between the living and the non-living that Rahm speaks about here replaces the function of objects and walls in usual sense-perception. This replacement of clear and known references to the surroundings with minimal affective climatic conditions, I argue, goes along with the replacement of the dichotomy between subject and object with intensities.

Even though we seem to not be able to fully grasp how an increase in hormone production impacts the way we feel and act, or sense the oxygen in the air while we breathe, in *Hormonorium*, we do get a certain sense of how these processes are related: The low levels of oxygen in *Hormonorium* stand in contrast to the energy consumption of the body, which has been set to an atmosphere outside *Hormonorium*. This contrast produces an intensity that can be sensed in different parts of our body: breathing might get harder, our skin warmer. But moreover, our mood might change; we might feel agitated, or nervous. Even if becoming aware of these processes might include consciousness, the process itself does not depend on it. In fact, this happens all the time as our body encounters different micro-climates throughout the day, while the body itself has different amounts of energy available and therefore responds differently to these changes.

To understand how the piece enables an aesthetic experience of metabolic processes, we ought to take a look at the different forces behind the effects on experience in *Hormonorium*. Oxygen levels, temperature, and light intensity radically differed from the outside. While we do not have a sense that registers oxygen, temperature, seems to be more easily noticeable, as thermoreceptors in our skin detect temperature changes and signal warm or cold temperatures. Temperature perception is localized in the somatosensory system, which also processes the physical sensations of pressure and pain. The activity of these receptors, however, depends on changes in outside temperature. If temperature stays steady, they decrease their activity. In decreasing the temperature in *Hormonorium*, these senses are activated and signal the nervous system.

It is thus a question of thresholds in the outside temperature that have to be reached in order to activate them at all, to render the body sensitive.

The UV light, the third element of interest here, is dispersed in *Hormonarium* in such a way that it emulates the reflection of light rays by snow. When walking on actual snow, the sunrays reflected by the snow are less filtered by the eyelids because they come in at an angle from below the horizon. The disproportionate concentration of UV light increases the production of hormones such as melatonin and the synthesis of vitamin D in human bodies. These hormones impact emotional sensation (which might lead to feeling more awake, even aroused), but the physical condition can be experienced only gradually and after longer periods of exposure. The different intensities of these factors, and the different sensory modes with which one can potentially perceive them, make it clear that what is experienced here cannot be fully understood or rendered linguistically. Yet, the aesthetic milieu thickens these processes so that their effects can become thematic.

The aesthetic perception in *Hormonarium*, I argue, deepens the feeling of being present in the specific situation, which does not end with the sense of self or awareness for the body. In Seel's words,

[Aesthetic perception] applies itself to concrete presents in their irreproducibility, potentiality, and momentariness. It activates a sensitivity to the unmistakable color and hue, the unmistakable sound and mood, the unmistakable taste, and the unmistakable feel of a situation. Consciousness of presence in this sense—the consciousness of particular presents—is aesthetic consciousness. (2005, 102)

What follows from this unfolding relation can relate the experience to our sense of self: Coming to our conscious awareness, the way our body is coping with, for example, low temperature—as in shivering, goosebumps, and so on—might lead us to the assessment that *we* are cold. The sensation becomes significant for *me*, for the subject of experience. According to Seel, atmospheric appearing makes something appear in its existential significance to the one who perceives, because it relates to realized and unrealized life possibilities (2005, 92). If we relate this to the experience in *Hormonarium*, the metabolic bond between our bodies and the environment appears in its existential significance, because it reveals how our mood, feeling, and actions can be impacted by it and how vulnerable our bodies are towards the atmosphere. In recognizing this relationship between atmospheric surroundings and biochemical processes within our bodies, sensations can be ordered in modes of perception. The sensations of fatigue or agitation begin to mean something in this particular situation, begin to tell me something about the air around me and my bodily functioning. Thereby, atmospheric awareness reveals correspondences that are existential for the whole being, and becoming aware

of correspondences always addresses meaning to them (Seel 2005, 94). Bodily sensations are expressions of a trace, which points towards a zone of interpenetration between the body and its environment. After understanding the relation between oxygen levels and sensations in the body, such as emotions, maybe thoughts, I could imagine how lower or higher oxygen levels might play out in similar ways.

In *Hormonarium*, these correspondences between atmospheric composition and feelings can be identified with the different phases of experience and how they interconnect: To understand that there are correspondences between the atmosphere, the metabolism of the body, and cognitive processes such as feeling and thinking, the experiencing subject must first become sensitive to the different sensations as they emerge in these realms and how they phase into each other. Thereby, the sensitive body gains importance for subjective experience: the experience of different phases in which my body reacts to climatic conditions becomes significant in connection with the possibilities and limitations that this brings to me.

The intensification of metabolic processes can also come with a disorienting effect. The feeling of being-in the atmosphere, where there seem to be no clear boundaries between one's own body and the surroundings, can lead to a feeling of *being-atmospheric*, as, for some, the low oxygen levels lead to altered states of consciousness, a slight hypoxia.² As one visitor described it, "One had the impression of floating in space, of no longer knowing up and down" (EVSC 2019). Besides the fact that these experiences are subjective, the metabolic processes that enable them follow certain biological principles that all life forms share to a certain degree. The subjective experience joined with the metabolic, pre-reflective dimension of experience enables here an aesthetic experience that gives the situation its "unmistakable feel" and makes it stand out to the subject of experience. This unmistakable feel can also be described as a certain *mood*. The notion of mood as an access to the metabolic experience of *Hormonarium* will be further explicated. For that, I will return to Heidegger's notion of "Being as dwelling."

Attuning to Atmospheres

Atmospheric Involvements

The aesthetic of Rahm's design addresses the human subject as being co-constructed by the climatic conditions of a space. In the following, I will relate this indicated spatiality of the subject in Rahm's meteorological architecture to Martin Heidegger's philosophy of Being (*Dasein*). The philosophers I have

2 A condition that can develop if certain body parts or the whole do not receive enough oxygen. Subjects display unreasonable behavior, euphoria, and disorientation (Encyclopedia Britannica 2019).

referred to thus far have allowed me to formulate to which extent in an aesthetic situation a shift in our attention towards the processes between bodies and matter can create an awareness of the processual aspect of perception itself. Heidegger is no exception, and his elaboration of concepts like Being as dwelling and attunement will play a central role in the part that follows. At the time of writing his seminal book *Being and Time*, in the 1920s, he referred to one specific crisis that had begun to manifest—the drifting apart of culture and technology. His ontological theory of a pre-intellectual openness to Being, which manifests itself in being-possibilities, allows a discussion of this changing relationship, as it precedes unifying categorizations.

Being, in Heidegger's sense, is always already spatial; Being³ is being-there, being familiar with the things it encounters in the world, a world that is shared with other beings that handle the things encountered in a meaningful and caring manner. Looking at the interrelation of subjects and their (climatically conditioned) environment from an ontological perspective allows, in the following, for an explication of the role that atmospheric media play in the process of sense-making. Turning to the ways atmospheric media like air *involve* us with the world allows me to expand on the proposition that an aesthetics of metabolism enables a sense of being-with the world before the binary between subject and objective world is reinstated in experience.

Dwelling, as coming from *buan* (old high-German for *to build, to dwell, to care*), is, for Heidegger, the way Being is in the world: "The way in which you are and I am, the manner in which we humans are on the earth, is *buan*, dwelling. To be a human being means to be on the earth as a mortal. It means to dwell" (1971b, 145). If the manner of Being is dwelling, then Being is always and already in a place—Being is belonging to a place:

When we speak of man and space, it sounds as though man stood on one side, space on the other. Yet space is not something that faces man. It is neither an external object nor an inner experience. It is not that there are men, and over and above them space; for when I say 'a man,' and in saying this word think of a being who exists in a human manner—that is, who dwells—then by the name 'man' I already name the stay within the fourfold among things. Even when we relate ourselves to those things that are not in our immediate reach, we are staying with the things themselves. (Heidegger 1971b, 154)

This fundamental involvement with the things is part of the structure of Being. To understand Being means to understand it in its *involvement* with the things that make up its world. The world of an architect, in this sense, would

3 "Being" capitalized refers to Heidegger's *Dasein* and designates as such the human subject. Being is a being that is able to relate to its own being. Being differs from being (*Seiendes* or *Sein*), which can either refer to non-human entities or the being of Being.

contain pen and paper, ruler—and, for an architect like Rahm, air flow, tools to measure oxygen, and so on. The world as such presents the individual with their possibilities-to-be, presenting things and contexts to execute actions. Heidegger explicates this with the example of the hammer. The hammer can be put to use to assemble stuff—wood, nails, and so on—and to thereby build a home, a shelter for dwelling. Figuratively, the hammer enables us to dwell because it is through building a shelter, a home for Being, that Being can dwell. The hammer thereby allows Being to get involved with its world and to dwell in it. The totality of involvements of the hammer in this way discloses its relational significance for Being. As this relational significance, the involvements connect to the Being's possibilities-to-be: The functionalization of the hammer as a tool of composition and building opens up new possibilities of shaping Being's dwelling. To open up possibilities-to-be in this way, the use of the hammer has to make those entities that are involved in the totality of involvements intelligible to the Being (Heidegger [1927] 2008).

These possibilities-to-be, according to Heidegger, would have to reveal themselves to Being—they cannot be concluded from what is already known. What is expressed in this turn to metaphysical thought is Heidegger's skepticism about Western traditions of knowledge production, which he criticized as expanding existing concepts to include everything new rather than letting the world reveal itself. The refrain of concepts, therefore, stands in the way of experiencing the truth as it reveals itself for Being. In what follows, I will relate this proposition to Luce Irigaray's examination of air and breathing as involving Being in its surroundings while opening up possibilities-to-be. But before we get there, I will concretize Heidegger's approach, which addresses language as the place that reveals the truth to Being.

Because the revealing of Being's being is never complete, Heidegger sees the closest approximation to truth through language. The reason for this incompleteness lies for him in the world's relation to Earth: "The world, in resting upon the earth, strives to surmount it. As self-opening, it cannot endure anything closed. The earth, however, as sheltering and concealing, tends always to draw the world into itself and keep it there" (Heidegger 1971a, 47). Therefore, the Earth gives opportunities for being-in-the-world at the same time that it obscures these opportunities. The Earth is the reason why Being can disclose its own being and also the reason why this disclosure can never be complete. Even though Earth is fundamental to Being, it can never be grasped; it is beyond representation: "The unpretentious thing evades thought most stubbornly. Or can it be that this self-refusal of the mere thing, this self-contained independence, belongs precisely to the nature of the thing?" (Heidegger 1971a, 31). It is this withdrawal that is essential to the relation between the human and its environment from the perspective of metabolism.

As there is always something fundamental that eludes thinking, that is not fully disclosed to Being, the subject is dependent on representations that are always incomplete. The withdrawal of Earth that comes about through its tension with the world stands between Being and its understanding of its possibilities-to-be. It is this withdrawal from thought that signifies, in my exploration, the encounter of alterity in *Hormonorium*. Air as the critical medium of aesthetic experience in *Interior Weather*, as well as in *Hormonorium*, withdraws from relations of spatial and temporal dimensions. Is air too all-encompassing and fundamental to express meaning even in a pre-reflective and intuitive manner? Or can air design enable modes of perception that familiarize us with the unrepresentable nature of the metabolic relation to the world? Or does air just show us that we are “not the world,” as Morton put it (2013, 99)? What role can aesthetic experience of metabolic processes enabled through air design play in this regard? If air withdraws so completely, and if withdrawal is central to Heidegger’s conception of being and how it can reveal itself to Being, can air in fact be a better element with which to think than the Earth? This is the argument formulated by Luce Irigaray in her critique of Martin Heidegger.

Irigaray’s critical engagement with Heidegger departs from a supposition of a blind spot in his philosophy. This blind spot, as she argues, is sexually encoded: Heidegger’s refusal of corporeality and his appeal to rationality expresses therefore what Heidegger himself understood as the necessary misrepresenting of Being itself. As Heidegger points out, even though the representation of the fundamental involvement of Being with the world can never grasp this involvement, it is only by means of representation and abstract thought that Being can understand that involvement. As Irigaray states: “The Being of man will be constituted on the basis of a forgetting: of the gift of this from which of which he is. Beginning with the void, on which he constructs himself like a bridge. All propositions, and, more generally, the *logos*, work in this way” (1999, 30).

Irigaray insinuates to Heidegger a blindness—more specifically a blindness towards sexual difference—and that he makes an easy escape into the representative realm of the *logos*. Against that, Irigaray proposes taking seriously Heidegger’s notion of the unthought, which is foundational to representational thinking, and tries to develop a way of thinking that is itself unrepresentable. In order to do that, she opposes Heidegger’s concept of Earth with air—air as that which is before Earth, before all relation.

Air could be this nothing of Being: the Being of Being. It could be this secret that Being keeps, could be that in which earth and sky, mortals and divinities, belong together. But he [Heidegger] has forgotten this simple constituent of *physis*. He no longer hears it except through the voices of the *logos*: the paths he has already laid out within and on *physis*. It is

from the path—which would not be had he not opened it—that what has always already given him air now comes back to him. The elementality of physis—air, water, earth, fire—is always already reduced to nothingness in and by his own element: his language. (Irigaray 1999, 74)

In “The Forgetting of Air in Martin Heidegger,” Irigaray argues that, in fact, air is the “unthinkable that exceeds all declaration, all saying ... [w]hile remaining the condition of possibility,” (1999, 5) and that therefore air—and not the Earth—is to be taken as the condition for thought. The Earth, according to Irigaray, is too stable, too thinkable to fulfill the role addressed by Heidegger. Instead, she argues, it is air, “the open element that encloses us all,” air, which is the

... constitutive of the whole of the world, without this generativity ever coming to completion in a primordial time, in a singular primacy, in an autarchy, in an autonomy, in a unique or exclusive property ... But this element, irreducibly constitutive of the whole, compels neither the faculty of perception nor that of knowledge to recognize it. Always there, it allows itself to be forgotten. (Irigaray 1999, 8)

Air is an opening to itself, according to Irigaray, a site of the primordial un-thought “there is.” She insists that air must be explicated, because this element of the un-thought conditions all things.

An encounter with “there is” requires and enables an experience in which the experienced does not become an object, but can be perceived in its appearing. Rahm’s spatial situations offer such an encounter. They offer an opportunity to attune to the invisible gaseous layer around us. Attunement as a possible way to encounter Irigaray’s “there is” could be understood in this sense with Heidegger’s pre-linguistic encounter of Being and world. For Heidegger, the way Being encounters the world, how it *attunes* to the world, also determines its *understanding* of the world. Attunement (*Befindlichkeit*) and understanding (*Verstehen*) were, to him, two aspects of the same phenomenon: Attunement is always a form of understanding, and understanding is always a way of attunement (Loht 2017, 63). Although I agree with Irigaray’s critical reading of Heidegger, this notion of attunement remains valuable for understanding the aesthetic experience of metabolic processes in Rahm’s projects. Attunement, for Heidegger, expresses the capability of Being to be affected by a situation. As such, attunement is *being in a mood*. Being is always mooded in a way; the mood I am in shapes how I perceive the world. But attunement does not equal emotional affect. Rather, it is an existential condition that underlies the possibility for emotion (Loht 2017, 57). Attuning to an atmosphere, then, means to become familiar with it, to understand its effects on one’s bodily and cognitive capacities.

As stated above, the world that is encountered in Rahm's work is encountered in an atmospheric way. His work explicitly targets the mood of the inhabitants and, therefore, how they are in the world through the climatic condition of that world. Being's always being-in-atmospheres is revealed, that is, the effects the atmospheric composition has on the way we feel, perceive, and act. This being mooded through the atmosphere, the possibilities of being affected by it given through the doubleness of the body as the living and sensing vehicle to the world, makes the way air expresses this relation hard to grasp. The air is not a thing in itself we could refer to. Following this claim, the aesthetic experience of the metabolic dimension of our being in *Interior Weather* and *Hormonarium* gain new importance: If air institutes meaning not in the faculty of perception, nor in that of knowledge, how, then, can it become meaningful to an experiencing subject? To answer this question, I will propose in the following a concept of the human that brings together its cultural and biological dimension. The aesthetic dimension of this concept will be explicated as that of metabolism. The meaning institution thereby shifts towards the thresholds between bio-chemical processes inside and outside of bodies, between hormone-production and feelings, feelings and thoughts.

The concept of the *bio-cultural creature* formulated by Samantha Frost allows me to explicate that it is through the restraints, the limitations of metabolic interrelations with the world, that we can become sensitive to them. The possibilities-to-be in the air, then, come with the experience of limitations and contrasts that replace oppositions and lead to different phases in experience sensed in varying intensities.

Being-in-the-Air

Frost has addressed the question of human agency as emerging from biochemical relations. While writing in line with feminist scholars such as Judith Butler who understand the material, sexed body as a discursive formation, Frost moves a step further, arguing that the human subject is shaped not only by its material-cultural surroundings, but also by its biochemical activities. Being aware that rethinking the human subject in terms of the materialization of historically specific norms (Frost 2016, 121) can lead to an over-emphasis of the social context a subject develops in, she tries to define the human subject as co-constructed by environmental structures, without making the subject formation all dependent on it. Invoking Frost's project in the following allows one to think about the conditions for a metabolic subjectivity and particularly the role of aesthetic experience as accompanying phenomenon.

Frost's biocultural creature is characterized as *energy-in-transition*, meaning that "the living body's biochemical activities depend on and effect transitions

in energy, transitions that themselves are profoundly dependent on a living organism's immersion in and engagement with its habitat" (2016, 119). To not end with a description of the living organism as a mere epiphenomenon of its environment that would re-inscribe yet other dichotomies, she introduces the principle of *activity-in-response*, which obtains the dimension of a carried and corporealized history:

[The] living history is the organismic material and activity through which the current environment has its effects. The proteins and other biomolecules that an organism's cells use to process and respond to chemical signals generated through the organism's encounter with the environment—those proteins and biomolecules are produced, in part, by the responses of previous generations to their environments. As a consequence, the effects that an environment can have on a porous organism are constrained by the responses of those previous generations to previous environments. Similarly, and from the obverse perspective, the responses an organism can muster in response to the provocations of its habitat are constrained by the ways that prior generations' responses shape its own processes of composing and decomposing (Frost 2016, 123).

For Frost, these constraints follow from a principle non-contemporaneity that characterizes the biocultural being and its habitats. She identifies a genuine latency between the effects of an environment and the response of an organism. The relation appears further as permeable, but all transmissions occur selectively. This exemplifies a closer look into oxygen that suggests, as Samantha Frost argues, the consideration of oxygen as a central element of air reveals the constitutive and selective permeability of cells (2016, 101) that is necessary for the whole organism to survive:

It is not just that the permeability of cell membranes effects a continuous influx and efflux of molecules but also that there must be that influx and efflux. Living organisms do not just happen to exist in an environment that filters into and out of their cells. Instead, they are critically dependent on an environment filtering into and out of their cells. (2016, 101)

What for Merleau-Ponty was structured by the symbolic texture of the invisible reality is, for Frost, likewise not without order. The scope of possible effects and potential response is not infinite—it is structured by prior generations and their interrelations with the environment. Such constraints therefore allow for freedom and novelty to arise, and for one to not reduce the biocultural being to mere response-mechanisms. There is no continuous flow on the biochemical level of organisms. Each phase that is part of metabolic processes is open to disruption. As Frost explicates, describing cellular respiration:

[E]very step in the processes of cellular respiration is important because the transition each step effects is the condition of the next. Among all those steps, the arrival of oxygen in a cell to extract the trash it must extract—this arrival is one that depends critically on the relationship between the body entire and its environment. In other words, oxygen gains its importance not for an outstanding or premier role, not for a particularly extraordinary contribution to an otherwise humdrum process, but for its vulnerability to disruption, for its utter dependence on the organism's interface with an oxygen-rich habitat. (2016, 106)

This vulnerability to disruption is not only key to rudimentary biochemical processes within an organism but also to aesthetic experience. Only in confrontation with a reality that is different from what we expected can new meaning be addressed to that reality. In *Hormonorium*, the aesthetic experience is enabled by the unexpected foregrounding of bodily processes as they become the content of subjective experience. Perception as a process of meaning-making that involves the whole body and the cognitive dimension of the perceiver becomes at once the subject of attention and the way of perception.

Furthermore, it is the vulnerability to disruption that enables us to sense the climatic changes in *Hormonorium* at all. Perception as bound to an intentional subject here blends into perception as described by literary scientist N. Katherine Hayles as that what “precede[s] consciousness and directly address[es] the body's affective responses” (2017, 173). The atmospheric milieu created in *Hormonorium* exposes that a shift from the perception of an opposite or outside the body towards corporeal sensations occurs when the climate around us radically changes. This shift from perception to sensation is central to understanding how changes in our surroundings start to matter for an organism. The experience of the wider dimension of our engagement with the world, which includes pre-reflective, bio-chemical relations, becomes meaningful to an experiencing subject when we understand that the world of our conscious and intentional reference is dependent on it. What is crucial about this experience is that the minimal affective qualities of intensified atmospheric processes also show how these processes relate to the way we perceive our environment, how we feel and act. The metabolic processes not only mediate the relations of the human and the environment, but also materialize potentialities of those very elements that the relations are composed of: in producing more hormones of a certain kind that allow one to be active in areas with little oxygen, building out larger lung volumes to make the best use of the oxygen available, and so on. The vulnerability towards disruption that Frost discusses as an essential quality of organisms thus comes with the potential of re-organization, of developing new responses to changed conditions that allow the organism to stay alive. An aesthetic experience

of these bodily capacities might then have profound effects on the way we understand the human subject as grounded in bodily processes.

So far, I have explored how atmospheric processes in *Interior Weather* and *Hormonorium* register in space and become sensually experienceable through the way they effect the body. The different modes of perception thereby enabled, at the same time, bring to the forefront of our awareness the phenomenological lived body and how the limits of this bodily sensitivity seem to not be objectifiable or unchanging but instead marked by intensities. These intensities, which, by their emergence, undermine the apparition of a continuous flow, can give way to novel institutions of meaning. The question now is, how can such an experience become meaningful in everyday life? What is that sense that addresses meaning to metabolic interrelations with the world? The basic awareness of internal processes in relation to an external environment is an expression of a fundamental concern for survival. In human organisms, this sense can be described further as interoception. Interoception provides us with an alternative to thinking about bodily capacities reduced to machine-metaphors. I will expand on this proposition in the following.

From Representation to Interoception

If aesthetic experience allows one to make sense of an encountered situation in relation to myself and my life situation in general, where is that sensitivity for bio-chemical processes located, and how would they start to matter for a consciousness? The ability to be sensitive towards the bodily processes and to communicate them to others, to act accordingly within the world without the need to be consciously aware of it, is fundamental to being human. If I am hungry, I will prepare food or search for a nearby restaurant. If the air in the office gets stuffy, I will open a window. Before the feeling of hunger and the evaluation of air quality, before making food and opening windows, we go through a biochemical process that, at some point, signals to our nervous system. It is this mediation of the relation between our biological needs and our environment, which is centered around the concern for the ongoing re-establishment of a momentary equilibrium, that can become meaningful in the experience of disruption.

If I conclude that the feeling in my stomach and the growling noise coming from that region mean that I am hungry and that I should ingest food, I start to reflect on my options at hand: Should I re-heat last night's leftovers? Chop a salad? Go to a restaurant of my choice? The sequence of biochemical processes that signal to my nervous system, the noticing and interpreting of the thereby invoked feelings, and my habitual response is not that different from the potential sequence of processes and experiences a visitor goes through in *Hormonorium*: As the body of the visitor is objected to a radical

change in the atmosphere that provokes biochemical processes that might be felt in different ways, this experience can be reflected upon.

This interrelation of physical and emotional experience does not usually come to our awareness, yet it plays a central role in our physical and psycho-social wellbeing. In cognitive science, it is subject of research on interoception—also known as “gut feeling.” Interoception is identified as the sense that perceives internal processes. Studies suggest a connection between this sense and the composition of a subjective perspective, between how we feel and how we act in the world. In this view, it is the recognition of bodily needs and learning how to communicate them to others that paves the way to become the social beings we are. Interoception can thus be ascribed the “... role of both sensing and integrating all aspects of the body’s physiological state and motivational needs, from low-level monitoring of blood chemistry, the representations of skin and body temperature and sensations evoked by pleasant interpersonal touch” (Tsakiris and Critchley 2016, 1).

In detail, interoception senses changes in the hormonal, chemical, and thermoregulatory states that impact the way we feel and how much physical energy we have in a situation, and therefore influences our intentions and actions. The body thereby enables sensory experience not only external to itself in the environment, but also sensory experience of internal biochemical processes, as they go along for example with digestion. In subjective experience, interoceptive feeling is often without clear origin, which is why it is, as a gut-feeling, associated with intuition. Within this text, interoception can help to understand how pre-semantic, subjective experiences of metabolic interrelations between bodies and environments can become part of our conscious experience without being completely subsumed by representation and symbolization.

Research on interoception furthermore allows one to figure subjectivity not as fixed but as part of the continuous process of meaning-making that happens in relation with the environment. One contemporary position to be acknowledged is represented here by psychologist Helena De Prester. For De Prester, interoception has an impact on our psychological development. It enables a form of subjectivity before a clear formation of a self. De Prester stands for a rather radical embodied approach in cognitive science, stating that, before the self, there is subjectivity as a sentient and aware perspective; it is a subjectivity that lacks spatial extension and is marked by self-affectivity and the capability to be affected both by processes inside the body and outside of it: “Subjectivity is a sentient form of being a perspective. Sentience, or awareness, refers to the capacity to feel or to be affected—internally by one’s own body or externally by the environment” (De Prester 2019, 294). This description of sentience as the capacity to be affected recalls Spinoza’s famous claim that no one has “laid down the limits to the powers of the

body," (1677) and that the body is, in fact, not constituted by its form, but by its capacity to affect and be affected. This relation of interoception to the capacity to be affected and to respond to being affected makes the term relevant for studies of affect and the description of subjective experience. Invoking this concept in the description of aesthetic experience in Rahm's projects allows one, therefore, to explain the role that the transition from being affected by atmospheric conditions to metabolic response plays in subjective experience.

Interoceptive awareness in Rahm's works comes with the experience of change from one experiential state to another: In attuning to the shifts between intensities, sensations, and modes of perception, the thresholds of these phases can be disclosed as deeply connected to our pre-reflective mode of being-in-the-world that encompasses our bio-cultural dimension. Rahm's architecture actively involves this pre-reflective, intuitive reference to the environment and allows me to further consider the role of sensitivity for internal bodily processes in aesthetic experience.

To put it briefly, the concept of interoception allows us to understand that the environment as a context for meaningful relationships does not end outside of our skin. We can argue further that a heightened interoceptive sense would allow us to become familiar with spaces that are meteorologically designed, because the feelings, thoughts, and moods that follow them can be placed in a larger context. To put it another way, the inner processes of bodies and the pre-reflective sense of agency that allows one to perform certain actions that help one to cope with temperatures that are too low or too high can be understood as part of architectural design itself:

From an anthropological point of view, when we think that we are too cold, or the opposite, when we think that we are too warm, we find the cause outside of ourselves, in an inadequate outside climate, at an atmospheric level. And we try to make this outside climate comfortable by correcting it—that is the origin and the mission of architecture. In reality, the first signs of architecture are physiological and totally internal and autonomous, to perspire if it is too warm or to shiver if it is too cold. They are the first answers to a rise or a reduction of the body temperature due to an unfavorable thermal environment. (Plewke and Rahm 2010)

After this first response, aiming to reduce the body temperature, other measures follow: drinking water if it is too warm, or eating and letting the body produce heat if it is too cold. For Rahm, these basic behaviors are "corrections" that continue in the management of the environment itself.

Is architecture, in this sense, the organization of bodies in space regulating their bio-chemical processes? The operations of the body—which Rahm calls "corrections"—include, as Rahm lists them, moving to get warm or to search

for shade, dressing up or down, and, lastly, building shelter. Architecture, as this way to shelter from an outside, makes use of exogenous measures taken from the outside world that are, in fact, body projections (Plewke and Rahm 2010). To offer an architecture that engages all these layers—as in bodily action, clothing, the material and spatial outline of an indoor space—to face ecological crisis today, Rahm wants to “go further down in scale of measures of climatic corrections in order to investigate sensitive zones closer to the body, on the limit of our skin, to reach the point where architecture dissolves and becomes pure thermogenesis” (Plewke and Rahm 2010). One way to investigate these sensitive zones and the meaningful relationships that emerge from them is with interoception. Interoception now allows me to explicate the experience of metabolic interrelations in *Hormonarium* and *Interior Weather* as encompassing bio-chemical and cognitive-emotional modes of perception.

The coupling of the human with the environment can be experienced in Rahm’s works through temperature, radiation, and chemical compounds in the air that affect the whole being, its physical processes, feelings, thoughts, and behavior. As I have mentioned before, these effects cannot necessarily be seen, but are felt, sensed, or experienced in different, subjective ways. What comes into view here is a conception of embodiment in which the body is neither completely open nor completely closed, but rather a regulating and mediating force that materializes potentialities, and where intensities replace clear borders. An aesthetics of metabolism accounts for the materiality of our bodies and atmospheric environments and the mutual affectations. In thus joining the aesthetic framework of Rahm’s architecture with contemporary theories of embodiment, representation—addressed as a higher-cognitive function in human beings—can then be replaced with a sensitivity towards homeostatic processes. As Gallagher puts it:

Parts of the brain, e.g. the hypothalamus, operate on homeostatic principles rather than anything that can be construed as representational principles. Homeostatic regulation happens via mutual (largely chemical) influences between parts of the endocrine system, and signals from the autonomic system ... There are real physical connections here in the complex chemistry of the body-brain system in its coupling with the environment, and in that complex chemistry one factor often modulates another. (2017, 39)

Can sensation, and thus ways to sensitize, offer an alternative form of knowledge about how we are in the world? Would it provide further access to the meaning of atmospheric processes and how they relate to our actions? Sensation *qua* perception gains importance in this line of thought.

Following philosopher David Scott in his analysis of Gilbert Simondon’s criticism of the phenomenology of his time in the mid-20th century,

sensation allows something to appear in the margins of thought, however fleetingly, anterior to a conceptualization of an object (2014). Contrary to phenomenology, in sensation, there is no intention to grasp an object in itself in order to have knowledge of it (Scott 2014, 118). Apart from perception as bound to a first-person perspective, intuitive knowledge gained through sensations and affectations becomes central as that “which permits a true appreciation of how the relationship between the consciousness and the individual comes about” (Scott 2014, 118). The sensitivity for our metabolic dimension of being, I want to suggest, thus comes with a new form of intuitive knowledge. An appreciation of how the relationship between the body-brain chemistry and the coupling with the environment comes about offers new ways to imagine possible engagements. I will tackle this idea further in the next chapter by explicating Dewey’s understanding of aesthetic experience.

Aesthetic Experience of Metabolic Interrelatedness

How can we understand being in its *involvement* with the things that make up its world if this world is encountered as atmospheric? What are the possibilities-to-be that come with Rahm’s air design? My exploration of interoception has shown that we have a way to sense the internal processes of our bodies and that this sense is in fact what grounds the psycho-social dimension of our self. It is this sense that translates physical impulses into a meaningful context that enables action. And it is this translation that enables an aesthetic experience of the metabolic processes that give rise to sensations in the first place. This last section will address the question of how living in atmospheric environments as envisioned by Rahm could be seen as an alternative to an air design that tries to shield off atmospheric changes or promote a general gap between internal and external spaces. The key to a positive assessment of such spaces, as I will show, lies in the joy of the aesthetic experience of metabolic relations.

If a new dimension of the experience of space is added through intensifying the metabolic exchanges between bodies and space, this relation must be reconsidered. If the bio-chemical processes of our bodies were to become the genus of an aesthetic experience, a perspective on the relation between the human subject and its environment would emerge that would assign a new significance to the pre-reflective, sensitive relationship in the production of meaningful relationships to the world. Instead of appealing to reason, *Interior Weather* provokes habits that are considered more climate-responsible—not in a lecturing way, but instead in guiding behavior through affordances at the sensory thresholds of our awareness. Answering the question of whether controlling the climate is consequently architecture’s principal task, Rahm answers:

Yes. There's no other choice. But I wouldn't use the term 'control,' with its modern, normative connotations. I would rather say, that design of the atmosphere is now the domain of architecture. And the new ecological norms accentuate that. Today, interior space is insulated to the point where one can practically heat a house with the flick of a lighter. But this gives rise to new problems such as oxygen renewal, evacuation of the humidity that ensues from respiration, or adjustment of temperatures to 22°, 19° or 16° Celsius, depending on what a space is to be used for. One can see that the exigencies of sustainable development are causing an increasingly dramatic and fundamental shift in architecture, from the tectonic to the climatic, the visible to the invisible dimensions. (Stalder and Rahm 2010, 89)

If architecture thus considers increasingly atmospheric dimensions in human dwelling, the control patterns of our air-designed environments become invisible. Using the liminal affective qualities of air, our breathing bodies, too, become part of the structured environment, metabolically and functionally embedded. In intensifying the different modes of experience, Rahm's installations further the interrelation between bodies and environments, bringing to the foreground the transitional character of this interrelation. Aesthetic experience here is then neither just physical nor just conscious and abstract, but instead oscillates in between.

This also aligns with Dewey's pragmatist understanding of aesthetic experience. For Dewey, the bodily pre-linguistic cognitive, emotional, and sensory-perceptual engagement with the world was foundational for the constitution of meaning, and aesthetics were a way to study it. As he stated,

Experience is the result, the sign, and the reward of that interaction of organism and environment which, when it is carried to the full, is a transformation of interaction into participation and communication. Since sense-organs with their connected motor apparatus are the means of this participation, any and every derogation of them, whether practical or theoretical, is at once effect and cause of a narrowed and dulled life-experience. (Dewey [1934] 1980, 22)

As philosopher Mark Johnson (2015), following Dewey, states, the subjective experience of the feeling of qualities of an experienced situation enables us to account for meaning as grounded in bodily experience and hence also for aesthetics as visceral, pre-linguistic embodied meaning-making. With Dewey, we can further understand this embodied way of meaning-making as joyful. This joy comes with the overcoming of tension between subject and world. In his pragmatist philosophy, the relation between subject and world is thought of as deeply troubled. It gives constant rise to disruption and obstacles that require a constant expansion of strategies for problem-solving. In aesthetic

experience, these obstacles are overcome, and we sense what Dewey called a new “harmony” ([1934] 1980, 14) and what we might instead call the experience of a newly reached meaningful relation to the world that offers possibilities-to-be. This feeling of meaningful engagement with the world in aesthetic experience is necessarily temporal and therefore something that makes the subject strive towards the re-establishment of that meaningfulness. If the border between experiencing subject and environment is replaced with intensities as they arise from contrasts and as they create tension, then the overcoming of that tension through interoceptive awareness can be joyful.

The disturbance experienced in *Hormonarium* when our bodies begin to respond to the atmospheric composition might, then, lead to a feeling of meaningfulness and spatial presence when the disturbance is overcome and a new temporal equilibrium is reached. Understanding the different sensations in relating them to the newly figured context of experience—from noticing shortness of breath or bright light to more distinct physical and emotional feelings—can lead to the aesthetic experience of being part of and engaging actively with climatic conditioned environments.

In thus experiencing the vulnerability of our bodies as they are enmeshed with our atmospheric surroundings, new-possibilities-to-be can be disclosed as well: If we become attuned to the impact atmospheric conditions have on our wellbeing, our cognitive capacities and those of others, we can take these relations into account—unlike in air design that would try to shield off unwanted atmospheric impacts. In times of ecological crisis, architects like Rahm have understood that such barriers against unwanted atmospheric impact can only be temporally and spatially limited. What is needed instead is a becoming-familiar with a dimension of our being that brings together the withdrawal of meaning in the air and how the effects of these concealed meanings register in subjective experience. The metabolic subjectivity is enabled to experience itself as simultaneously biological and cultural, and might come to experience the ambiguity at the root of its being in the air as positive, as it attunes to the intensities created by metabolic processes. If the belief in a reliable subject is replaced by the idea of the bio-cultural creature, then Rahm’s spaces can offer an opportunity to positively evaluate these experiences.

Towards a Metabolic Aesthetics of Atmospheres

Neither is the air we breathe empty space, nor is climate change only occurring on planetary scales. Pollution, radiation, heat, and diverse particles travel in the air around our world, take on the form of gases, matter, and ice crystals, and penetrate our bodies. Atmospheres have been revealed as being part of aesthetic milieus that enact metabolic flows and show how sensory

experience unfolds as a field with which our body actively interrelates. We share atmospheres on the scale of molecules and can experience them in multiple ways; and our self seems to arise from these experiences.

This emergent self has been explored here as a metabolic subjectivity—a subjectivity that is characterized through transformation and transitions, arising as a momentary composition, rather than a stable substance that would give rise to a predetermined form. I have connected this notion of the self as only one level of the ongoing process that is life to the situated modes of perception and sensory experiences enabled in the atmospheric artworks of Rahm. Necessarily challenged were the notions of identity and intentionality. These notions can be replaced by processual ways of relating to environments, if we choose to look at being-in-the-world through the lens of metabolism as a principle of transformation, and interoception as the sense that integrates transformations in a meaningful way. Meaningful experience can, then, be understood as coming out of a resonance between divergent forces. These divergent forces in Rahm’s installations are homeostatic forces, which can be experienced through interoception. When interoception thereby replaces representation and abstraction, the notions of identity and intentionality have to be rethought so that they become thinkable as emerging from the relations between living beings and their environments, as being precisely this relation. An aesthetic that turns to liminal, visceral processes must then be an aesthetic emerging from the biological as well as cultural engagement with the world—an embodied aesthetic that studies the modes of experiencing of interactions that are pre-linguistic and pre-reflective, but that constitute meaning for the experiencer.

How can we describe the aesthetic experience of metabolic processes in these first examples? In *Hormonorium*, the climatic conditions inside the installation space differed from the external environment to such an extent that certain feelings and moods were triggered without providing any distinct source in perception. I explored, here, how the impact of climatic conditions on internal processes of bodies and, ultimately, on the feelings and actions of a subject in an environment could be perceived in an aesthetic way. In this part of the reflection, I built on the figure of the bio-cultural creature as brought forward by Frost, and developed it further along the explorations of aesthetic milieus, emphasizing how the biological dimension of this hybrid figure comes to the fore in aesthetic experience.

In *Hormonorium*, it is one particular characteristic of aesthetic perception that makes us shift our attention towards the biological part of being as a bio-cultural creature. That is, an object or a situation are not considered in their being-so, but in their appearing (Seel 2005, 89). Therefore, processes usually in the background of conscious awareness come to the fore as they create the context of an object or a situation in its appearing. In focusing on the shifts in

perspective that bring processes in the background of our experience to the fore in aesthetic perception, I showed how experience can be seen as processual in itself, as a way of engaging with the world that enables us to have a meaningful experience.

From a metabolic perspective, this background of perception can also be the internal, bodily processes themselves: how the body produces hormones, transforms oxygen to energy, and so on, in order to engage with the surrounding environment. Interoception, as the sense for inner processes, can tell us something about how we feel and why—for example, by feeling that we are tired and that this might have something to do with our surroundings, such as the atmosphere, or with our own bodily states, such as a lack of sleep, and so on.

An attunement to these interrelations with our climatic surroundings supported by the interoceptive sense was designated to open up to the subject new possibilities for being in the world in attunement, through an acknowledgment of the involvements with the world enabled by the biochemical dimension of the body. In Rahm's second installation presented here, these provoked feelings were related to daily habits: how a person was supposed to inhabit and use a space was not communicated through interior design but through the "interior weather," fittingly the title of the piece, in which climatic conditions of an indoor space were meant to provoke a certain behavior.

The atmosphere of a space, the bio-chemical processes internal to one's body, and the emotional-affective dimension of experience could now be seen not as separate but instead as continuous. This processuality of experience was explored both regarding the medium of experience and the perception of those processes. Air as a medium changes continuously due to meteorological processes, and thereby, at the same time, changes how we perceive and what.

The fundamental nature of metabolic processes has enabled me to further emphasize the relationships with other organisms with which we share metabolic pathways, and the reciprocal effects of that relation. For this shift in perspective, I argued, it is necessary to bring to our awareness relations between humans and the environment, which are constantly changing depending on bio-chemical processes inside and outside the human body.

The second aspect of aesthetic perception I focused on was that, in aesthetic perception, we relate a specific situation or object in its appearing to an individual life situation (Seel 2005, 95). We come to see how an object or situation corresponds with different contexts we are familiar with. In remembering, for example, that we have seen something similar before, or in imagining how we could engage with an object or a situation, we relate them to our own life situation. The way this comes about has been described

in relation to the possibilities of being that we see for ourselves. I discussed this point in line with Heidegger's notion of Being as being-possible, that is, the possibilities of one's own becoming that are connected to the involvements with the world, which Heidegger's Being finds itself in. If, in aesthetic perception, we come to understand further involvements of a situation or an object that relate this situation or object to our own life situation, what possibilities for acting we perceive might change as well. In an aesthetics of metabolism, these involvements bring into view shared metabolic pathways with others that are not necessarily human or present as such.

[3]

Aesthetic Milieus of Shared Concern: *Oxygenator & Urban Algae Canopy*

The camera moves along the faces of a group of elderly people. Their facial expressions are serious. They all look in the same direction with a steady gaze. It seems as if they are waiting for something to happen. The camera view is slightly fogged, and a stream of vapor cuts through the air. The camera's eye moves further along the waterfront, revealing a group of young people lying in the grass, chatting, sharing drinks. The vapor is still present. If the scene were not placed outside in a park-like area and if the people were not dressed in everyday attire, one might think we were watching a scene in a steam bath. The location becomes more concrete when the film cuts to the group of elderly people again, this time from farther away. Cars drive by behind them. Separated by a thin line of leafless trees, a busy street seems to expand. In the front, we now see the source of the steam that had penetrated our view, and, finally, we comprehend the scenery altogether: a small neighborhood park with a pond placed in the middle that is emanating steam continuously. The elderly people are sitting on benches around the pond, looking across it, maybe searching for patterns of movement in the fog, maybe watching how the sun reflects on the water droplets, or maybe simply resting their view on the landscape without focus, pursuing their own thoughts.

This is my brief narration of the opening excerpt from the video documentation (Rajkowska 2007) of the public installation *Oxygenator*. This piece is my first example in this chapter of an aesthetic milieu co-constructed by atmospheric media in public space. The chapter also explores the installation *Urban Algae Canopy*, by Ecologic Studio. Both installations speak, to some extent, to the material and emotional effects of how oxygen-enriched air affects the way people perceive and act. *Oxygenator* was a site-specific intervention. It

was a pond installed in the middle of a neighborhood in Warsaw that added oxygenated air to the surrounding atmosphere. *Urban Algae Canopy* is a design work that embeds micro-algae in the partitions of a canopy that metabolize the carbon dioxide produced by visitors into oxygen. The more visitors that have been inside the canopy before, the greater the growth of the algae and, accordingly, the higher the concentration of oxygen in the air. My discussion of *Oxygenator* and *Urban Algae Canopy* is based on respective video documentations produced by the artist and designers themselves, as well as text material accompanying the two projects. Both sets of documentation are aimed at different audiences, but both seek to appeal to different senses by emphasizing atmospheric aspects.

I will take the installations as a starting point for my further investigation of the extent to which the utilization of elementary media such as air can lead to a shift in perspective that is sensitive towards metabolic processes. I will further discuss here to what extent this sensitization affects the concern for the environment that goes beyond immediate self-perception. In the previous chapter, I looked at the ways climatic conditions impact internal processes of bodies and, ultimately, the feelings and actions of a subject in an environment. I explored how an attunement with climatic surroundings would open up new possibilities-to-be in the world for the subject in attunement, through an acknowledgment of the involvements with the world enabled by the bio-chemical dimension of the body. Now, I want to extend this perspective and look at involvements with *other* bodies that we share climatic surroundings with, including non-human bodies. More importantly, these involvements between bodies that I will analyze happen again at the bio-chemical level.

The bio-chemical dimension of metabolic processes extends the organism into the environment in such a way that environmental processes impact the body, but the environment changes through these involvements as well. The atmosphere functions, thereby, as a medium because it enables the bio-chemical dimension of bodies and that of their surroundings to relate. This shared bio-chemical dimension can be understood as a zone of interpenetration: the air we breathe contains micro-particles and chemical compounds—a mix created over many centuries and today, in part, increasingly altered through human activity as well: industrialization, agriculture, nuclear waste, and so on. We do not see how the atmosphere changes in this way constantly, irreversibly, but sometimes we become aware of the effects of these changes, and call it, for example, air pollution.

Invoking this linkage between human actions and air pollution allows us to elaborate on the ways organisms are intrinsically connected with their environments. It reminds us of the fact that, in terms of geological time, the atmosphere is not fixed but in fact co-created by the living beings that inhabit it. This perspective also reminds us that we are sharing and co-creating our

environments with other living entities, a process that might become part of our lived experience in aesthetic situations like *Oxygenator*. Similarly to practices of placemaking, which is a design principle that builds upon shared values in neighborhood communities, a public artwork like *Oxygenator* offers a place to share time with others. In the following, I will explore how far the project might also enable a sense for aspects of this sharing of time and place that usually remain in the background of our experience, such as metabolic processes.

When it comes to metabolic processes that play out on spatial or temporal scales not graspable by human consciousness, the environment might still express the effects of those processes, which we can sense in the everyday. Therefore, the involvements that I will consider in this chapter are mediated by aspects of the surrounding environment in the form of traces that point towards correlations but are never identical to cause-effect relations. These aspects can be sensed in my examples through inclusion of different senses: the visual in the form of emergent differentiations that register in the surroundings, the olfactory in the form of smells induced here via oxygen added to the atmosphere, and varying grades of humidity that can be tacitly sensed by the skin. Involvements we are not necessarily conscious of are thereby shown as still having effects that we can attune to in aesthetic perception. It follows that, in my two examples, the environment itself is being re-shaped by correlations between human agents and other elements in the environment, whereby the effects of these correlations begin to surface, and engage the human subjects in new ways.

Joanna Rajkowska's *Oxygenator*

Joanna Rajkowska's *Oxygenator* was an artistic intervention implemented 2007 in the center of Warsaw, Poland.¹ In the middle of a lawn, Rajkowska excavated a 140-square-meter (1,507 square feet) and one-meter-deep (three feet) pond, surrounded by greenery, shrubs, and water lilies, with plenty of seats for visitors. The pond was also equipped with an underwater layer of air-ozonating and fog-creating equipment that created visible mist and water bubbles and enriched the air around the pond with oxygen, as depicted in figure five.

What I am particularly interested in is the way the installment of the pond and the aesthetic milieu it created marked a difference within the environment, a difference that leads, in the following, to new perspectives on the relations between the residents and this specific place.

1 My analysis relates to the video documentation and the description of the installation on the artist's website.

The place Rajkowska intervened into came with a weighty history. It marked the middle of the former Jewish quarter and the Warsaw Ghetto that, after World War II, was completely renovated so that no sign of the historical events remained. The situation the artist came across here was signified by a disconnectedness between the residents and their neighborhood, both socially and in terms of the surroundings. Before the installation of her project, there had been nobody lingering in the park, no chatting with neighbors. The park was layered with an atmosphere of anonymity—Rajkowska found a place seemingly bare of any relation to the neighboring residents. But this detachment turned out to be superficial; the relationship of the residents to the park was much more complex than Rajkowska herself had figured at first.



[Figure 5] Rajkowska: *Oxygenator*, 2007, Grzybowski Square, Warsaw; Centre for Contemporary Art, Ujazdowski Castle (source: Joanna Rajkowska).

To understand the role of aesthetic experience in the context of this piece, the following sections aim to provide a discussion of the impact the intervention had on the neighbors. I will argue that the neighborhood park became the context for new negotiation processes of identity and belonging, including the social dimension of the neighborhood, but also the bio-chemical and emotional-affective dimensions, which point towards different realms of interrelation and will be put into contrast with each other.

Oxygenator as a Socio-Political Intervention

At the time *Oxygenator* was being planned, the possibility of a World War II memorial monument in the park was being discussed. Many residents approached the artist and her collaborators during excavation, asking if her work was connected to these memorial plans. According to the artist, these questions were asked in a reserved, even fearful way. Residents were scared that the place would be taken away from them (Rajkowska 2007, 3'50). When the team around Rajkowska started digging, another question was asked repeatedly: "What have you found?" (Rajkowska 2007, 05'14). That was, according to the voiceover in the video documentation, when the team around the artist realized that it had dug up WWII-era graves.

People began to investigate themselves. In the video documentation, some residents are shown wondering around and searching for objects in the dug-up soil. In figure six, we see how a woman crosses the barriers around the construction side of the pond, obviously searching for something. Then, she picks up an object and wipes off the dirt with her hands, to then throw it back into the dirt after a short observation.



[Figure 6] Rajkowska: *Oxygenator*, 2007, Grzybowski Square, Warsaw, (source: FilMOTEKA Artmuzeum).

The camera, which shows these different situations in a slightly shaky zoom, remains at a distance, adding to the impression that something private and personal is happening in this moment that should not be disturbed. The suggested secrecy of these situations applies to the attitude of the residents towards the historic events as well, which people had remained silent about.

The art project changed this: the earth that was dug up seemed to bring back memories and stories that the locals then began to share. But this change was not necessarily positive, as the voiceover remarks. These stories that were being remembered and shared had a toxic effect (Rajkowska 2007, 4'26). People started discussing questions of responsibility and guilt: Who sheltered whom? Who denounced whom? At the same time, especially elderly people started to believe in the healing properties of the oxygenated air and returned to sit along the waterside every day.

A process of re-contextualization had begun, one that especially brought to the fore incompatibilities, alienations, and gaps between different positions. The narrative of the documentation makes this unfolding dynamic clear: After portraying how the installment of the pond motivated the residents to engage with the place and develop new habits, such as sitting by the pond for long hours every day and breathing the oxygenated air, the story starts to get complicated. According to the voiceover, the installation created political energy: Residents wrote pamphlets and collected hundreds of signatures for a petition to keep the site with the pond or restore it in the future instead of allowing a WWII memorial to take its place (Rajkowska 2007, 15'22). Some also began to help the artist with the maintenance of the pond.

At the zenith of the political quarrels about the present and future meaning of the site, the city administration put an end to the pleading of the residents: It replaced the expansive pond of *Oxygenator* with a square fountain framed with stones, with angular edges and stone benches, since a round "village pond" would not fit with the image of an international city of the 21st century. It seemed to the artist that all of the sprouting sense of agency, of belonging to the place, had been closed off again.

As disappointing as this ending might have been for some, in fighting for the pond's endurance, in returning to the site every day, the residents began to care for the place in new ways. The artistic intervention allowed them to create their own context of experience. Rajkowska puts this process into words:

What is most important, I believe, is to set a relationship in motion and hand control over to the people ... People have a very strong sense of whether something belongs to them or not. They instantly feel whether they can do something or not. If they don't, they go home to watch TV. But if they can—an unlimited scale of possibilities opens up in them. You just have to give them something. Create a context, a place, a situation. And leave it. (Kaja Pawełek and Rajkowska 2007)

Rajkowska's project shows the potential of aesthetic practice not only to bring invisible, underlying processes and rifts to the surface, but also to allow new

forms of engagement, which might either lead to new rifts or open up new possibilities for acting in an environment.

In re-contextualizing the park, the artwork shifts the attention of the neighbors to aspects that had been there before but had not been addressed, as well as new aspects that came with the redesign of the site. The role of attention in the process of aesthetic experience could be described here as follows: First, through the surfacing of underlying dynamics as part of the artistic practice, attention is directed to what existed under the thresholds of conscious awareness beforehand. Shifting attention, then, re-organizes the relation between a perceiving subject—the neighbors—and their surroundings—the park. Confronted with the new context of the site, attention determines what and how something is perceived, how the newly surfaced aspects of the site are assessed, and how far they afford behavioral response. While varying levels of attention are part of the process of perception, in the shift to an aesthetic mode of perception, attention needs to be moved from an object in its being-so towards its appearing. Attention is thereby linked to the feeling of surprise in aesthetic experience: We become open towards the emergence of the new. What causes the neighbors to shift their attention, then, is a change of the context of their experience in such a way that their expectations are no longer met.

Confronting a new context of experience—whether it be, for example, an art installation, a different city, or a redesigned park—confronts us with these expectations. Our attention is directed towards that which turns out to be different, which alerts us: a common object in an uncommon setting, different social orders or traffic regulations, or a dense veil of mist lingering above a pond. This confrontation with the new can either lead to a new understanding and engagement, to a sense of belonging, as Rajkowska put it, or to ignorance.

For Rajkowska, the story of *Oxygenator* shows how a certain pre-text directs our attention, how the way we attend to the world not only enables engagement with it, but also limits it: “The people sitting by the *Oxygenator*, looked ahead, into the mist, not at each other. Perhaps they had a pretext not to look at anything else. Even the old man’s dog was looking ahead. In a way, the direction of your gaze defines the whole situation. What you’re looking at” (2007, 643). If we understand this pre-text as a condition, it can be found throughout the dimensions of experience: In the previous chapter, I discussed how the biological dimension of our bodies, how healthy we are, how energetic we feel, impacts how we perceive the environment and possibilities of acting in it. But this pre-text also plays a role in the social dimension. Social norms, how we are supposed to behave in certain moments and which rules to obey, as well as the subject we become, what we spend our time with, and what we occupy ourselves with, develop from previous experiences and biological pre-dispositions. Even though such pre-dispositions have a priming

effect on our engagement with the world, we know today that they are not static, but in fact *plastic*. It is interesting to evoke the notion of plasticity and related studies here because it allows me to look at the relations between human subjects and their environments not as static but instead as a process of interrelation through which subjects and environments come to be. With regard to *Oxygenator*, the notion allows me to explicate the link between the diversity of residents' reactions to the piece and the processuality of aesthetic experience.

Research on brain plasticity is especially relevant in epigenetics and trauma theory. Researchers in these fields have pointed out that the individual has a scope for transformation on a biological and mental level, even at later stages of life. To quote philosopher Catherine Malabou on this:

The idea of cellular renewal, repair, and resourcefulness as auxiliaries of synaptic plasticity brings to light the power of healing—treatment, scarring, compensation, regeneration, and the capacity of the brain to build natural prostheses. The plastic art of the brain gives birth to a statue capable of self-repair. We know full well that the functioning of the brain can be disturbed by numerous pathological causes ... But the nervous system always demonstrates plasticity after such handicaps or lesions, whether or not these efforts are crowned with success: the affected structures or functions try to modify themselves so as to compensate for the new deficit or form a new and abnormal organizational schema that restores normalcy. (2008, 27)

Brain plasticity gives us the opportunity to reflect on the limits and possibilities of the interrelations between subjects and their environments. If we look at the neighborhood as facing a deep historical trauma that in part relates to the personal experience of some of the elder residents, and in part seems to have registered in the space itself, then the *Oxygenator* might have designated a space for dealing with it, and potentially, for healing.

The ability to transform after traumatic experience, to compensate and restore, highlights here a different aspect of metabolism—not in its biological sense but as processes of transformation in an organism that sustain possibilities of acting in an environment. It designates an engagement with the world that does not just aim to maintain static conditions so as to optimize organic functions, but that also accounts for a fundamental precariousness of living processes. As Malabou points out, not only is our body able to adapt to radical changes, but our nervous system and our brain also appear to be plastic (2008, 3). But while our body schema adopts newly transplanted limbs and the nervous system can repair itself, the brain, she points out, is nothing other than plasticity. Plasticity in the brain is more than a feature; it is the function of the brain itself. Even though “reparative plasticity” cannot always

reset neuronal functions to a previous state after a traumatic interference, at least, Malabou emphasizes, the brain shows attempts to reorganize a dysfunctional region at first (2008, 28). In biology, metabolic plasticity describes, for example, the adaptation of plants to the varying availability of essential chemicals such as nitrogen (Jia et al., 2019), or, in genetics, it describes, for instance, when cancer cells adjust their metabolic phenotypes to adapt to hostile environments (Pandey et al. 2019). In both examples, plasticity is associated with growth of a living entity, made possible by a metabolic exchange with an environment. To describe this exchange as plastic rather than flexible emphasizes the reciprocity and processuality of the relationship between entity and environment.

Within the framework of this text, I am interested in the ways that *Oxygenator* reveals different forms of this reciprocal shaping on different levels. I will explore which effects of these processes become sensual and how, in the aesthetic experience of these effects, the ties between experience and memory, between appearance and affect, are recomposed. The example of *Oxygenator* helps us, thus, to understand how an aesthetics of metabolism that expresses and re-evaluates processes of transformation across temporal leaps, pre-reflective interrelations, and interpenetrations of what is considered inner and outer realms of a being, can be expanded into the social dimension of human beings as well. I will return, in the following, to the bio-chemical and emotional-affective dimensions I see expressed by the piece. I will relate them to a certain characteristic of aesthetic perception that can be seen as the integration of perceptible effects generated into a meaningful context.

The Emotional-Affective Dimension in Oxygenator

Aside from the discourse around the history of the neighborhood, the oxygen-enriched air played an important part for the newly developed relations to the site, in adding a sensual and poetic layer to the situation. To further understand the role that emotional-affective registers play for an aesthetics of metabolism, this section explores the idea that *Oxygenator* created a context of experience that moves beyond a strict dichotomic relation between subject and environment. I will focus on feelings that were mediated by the interrelations of human bodies and the atmospheric surroundings that were enabled by *Oxygenator*, which seem to weaken the distinction between a human subject and the environment.

I thus turn to the elemental medium at play: the oxygenated air. The oxygenated air seemed to have the most obvious effect on those who believed in its healing properties. They came to sit at the pond and breathe the air on a regular basis, as depicted in figure seven. Some brought their pets or their own chairs.



[Figure 7] Rajkowska: *Oxygenator*, 2007, Grzybowski Square, Warsaw; Centre for Contemporary Art, Ujazdowski Castle (source: Joanna Rajkowska).

The elemental dimension of experience in breathing the oxygen-enriched air extended the limits of their ordinary experience and could, therefore, be described as spiritual or transcendental. What they seemed to perceive as an effect of the air went far beyond the phenomenological appearance of the pond and the fog.

The transcendental feeling of experiencing something beyond the ordinary was also shared by the “watchman” of the place, who helped construct the pond and later became its guard. During construction and maintenance and described on the artist’s website, he reported his “cosmic experience” of working in the water. The way the watchman puts his experience of working in the water into words—as coming into contact with something cosmic, thus something not from this earth—suggests that he cannot rationalize his experience. Rather, *it comes over him*. In sensing the cosmos, the watchman transcends his own singularity; he momentarily seems to become part of something other, enters a state of what we might call, in reference to philosopher Brian Massumi, “passion” (1995, 89). Passion is where Massumi locates affect as neither passive nor active, where affect leads to a radical suspension of action-reaction circuits and linear temporality (1995, 89). In having a cosmic experience in which an emotion cannot be related to a clear cause and is therefore beyond human grasp, the watchman comes to experience this affect, this leaping of the virtual into the actual, as the pure potentiality

that, together with what is empirically present, constitutes every experience (Massumi 1995, 96).

While the sensual stimulation of working in the water, of the smells, of the humidity felt through the skin and in breathing, added to these non-ordinary experiences, and was presumably shared amongst the daily visitors, the poetic meaning of the materiality of the installation must be considered here as well. The metaphorical meaning of media such as air and fog can set a certain mood that impacts how we feel: Air can be *thick with anticipation* if we expect something to happen. Something can be *veiled in haze*, or views can be *fogged* or *clouded* to describe the inability to see something the way it is. The performance of elemental media such as water and its turning into steam becomes especially meaningful to the observer, when their metaphorical connotations are associated with affects in sensual experience. The in-betweenness of affect, its being a “phase-space” (Massumi 1995, 93) that comes, in Massumi’s understanding, before all binaries and all objectification, informs the aesthetic experience of engaging with *Oxygenator*. In this sense, the sensual experience of the fog and water intermingles with the metaphorical meaning of the elemental media themselves, and forms something like a dense mood. As cultural theorist Ben Highmore describes this aesthetic of affect:

The wind that bites, that gets under my skin and gnaws at my bones with its bitter chill is a memory or a foretaste of a terrible coldness that is the feeling of isolation, homesickness, alienation, despair. The register of hot and cold, of warmth and frost, of passion and dispassion is an emotional and affective register. It is also, as is immediately suggested, a register of sensorial perception, and sensual expression. (2010, 121)

Registers of emotions and affect, of sensorial perception and sensorial expression, became shared within the aesthetic milieu of the *Oxygenator*. If we understand affect as “those registers of experience which cannot be easily seen and which might variously be described as non-cognitive, trans-subjective, non-conscious, non-representational, incorporeal and immaterial,” (Blackman 2012, 4) then affect is a helpful concept to address the question of how meaning is derived from these registers in *Oxygenator*. Conscious perception and intentional action play only a subordinate role therein.

In this way, *Oxygenator* created an intimate zone of interrelations between atmospheric processes in the environment and the people sitting at the pond, which expressed transcendental and emotional-affective aspects of these interrelations. A metabolic aesthetics, as I would like to formulate it here, allows an attunement to such interrelations that never become completely tangible. It finds an expression in the people sitting at the pond, breathing the oxygenated air for hours and days.

The challenge now is to understand how these processes might involve others, and how the subject of experience expands in attunement to an other without objectifying this other. Because an experience of metabolic interrelations necessarily withdraws from a subject's conscious grasp, a closer look at the different levels of attention and care as they impact the relation between human and environment can be helpful. According to feminist theorist María Puig de la Bellacasa, care is an ambivalent term, and embracing its ambivalent grounds allows for "a speculative exploration of the significance of care for thinking and living in more than human worlds" (2017, 1). For an examination of the pre-reflective experience of the processual nature of our relationships with the environment, it is also important to note that attention and care are not solely part of our conscious reference to the world; both are connected to our conceived possibilities-to-be. While attention seems often to direct a subject towards an object of experience in its being-so, care might introduce a relation that involves a subject and an object of experience on a different level, pointing towards a possible future rather than a current state. I will explore this in the following by first returning to Merleau-Ponty's notion of intersubjectivity.

Aesthetic Experience and the Sense of Care

Intersubjectivity: The Social Dimension of the Subject

The register of emotion and affect is not just foundational to subjective experience—it also embeds us in the world as the social beings we are. To answer the question of how aesthetic milieus can form the register of sensual expression to direct our attention to new potentialities of experience, in the following, I will explore processes of subjectivation with Merleau-Ponty's notion of intersubjectivity.

Intersubjectivity has already been introduced as a conceptual frame for the ways we go beyond our conscious, ego-centric perspective in order to create meaningful relations with the world. The intersubjective world that can be designated with Merleau-Ponty as the "carnal other side of the flesh," (McCleary [1964] 1995, xxii) towards which the subject extends itself as it temporalizes, has served me to explain how we face alterity in the biochemical dimension of our own bodies. In the following, I will explicate how this openness towards alterity can open up possibilities for being-with others, of being intrinsically linked by sharing a world. Intersubjectivity, in this way, allows us to consider ways of sharing a world that encompass the biological as well as the social dimension of experience.

Intersubjectivity, as it was first developed by philosopher Edmund Husserl, is described as shared reality. By me acting in the presence of an other, and them in mine, a shared presence is created from which the "we together" (*das*

wir beide) emerges (Husserl [1929–1935] 1973, 12). In sharing an experience of space and time, we can structure our behavior according to that of an other; we can take on the perspective of an other because we are sharing a conception of the world. The anticipation of an other's behavior in, for example, speeding up one's own steps to catch up with somebody in front of us, is only possible because we share a rhythmical pattern with this other. My body schema anticipates how much faster I have to move in order to bring myself next to the person in front of me.

This sharing of a rhythm, of a "manner of handling the world" (Merleau-Ponty [1945] 2012, 370). in intersubjectivity, Merleau-Ponty explicates, extends one's own intentions in space and time, forming the social dimension of the subject:

[I]t is precisely my body that perceives the other's body and finds there something of a miraculous extension of its own intentions, a familiar manner of handling the world. Henceforth, just as the parts of my body together form a system, the other's body and my own are a single whole, two sides of a single phenomenon, and the anonymous existence, of which my body is continuously the trace, henceforth inhabits these two bodies simultaneously. ([1945] 2012, 370)

Intersubjectivity then relies on modes of perception that enable the perceiving subject to recognize a familiarity in the way others are handling the world.

In *Phenomenology of Perception*, Merleau-Ponty highlights how attention tends to reduce what we perceive to what we expect, what we are familiar with. This points to the dilemma of the phenomenological method: Whatever is conceived in perception is perceived by a subject and is thus subjective. Yet, as the following passage shows, in his earlier work, Merleau-Ponty identified a certain manner in perception, that of "metaphysical and disinterested attention" as able to conceive of an alien, "silent Other":

One cannot, as we said, conceive of a perceived thing without someone who perceives it. But moreover, the thing is presented as a thing in itself even to the person who perceives it, and thereby poses the problem of a genuine in-itself-for-us. We do not ordinarily catch sight of this because our perception, in the context of our everyday dealings, bears upon the things just enough to find in them their familiar presence, and not enough to rediscover what of the non-human is hidden within them. But the thing is unaware of us, it remains in itself. We will see this if we suspend our everyday dealings and bring a metaphysical and disinterested attention to bear upon the thing. The thing is then hostile and foreign, it is no longer our interlocutor, but rather a resolutely silent Other [*Autre*], a Self that escapes us as much as the intimacy of an external consciousness does. ([1945] 2012, 374)

Can we become familiar with new rhythms in the environment as they register sensual expressions of how we are sharing the world with these “silent Others”? Can aesthetic perception function as an operative of intersubjectivity? Referring to Merleau-Ponty’s concept of intersubjectivity helps us to understand how the sense of sharing a world with others emerges from a pre-reflective embeddedness in the world. In the following, I will further explicate how a sense of this pre-reflective embeddedness might remain in aesthetic perception, and how it can become a meaningful aspect of the process of relating a perceived object or situation to an observer’s own life.

To recall this particular aspect of aesthetic perception is to first acknowledge that, in this mode, we begin to perceive a situation or an object in a non-ordinary way. Though non-ordinary, it appears in new meaningful constellations. In fact, as Seel states, we cannot really speak of an “object” of aesthetic perception in the first place, as it is “not just individual things but quite often constellations of things that come aesthetically to intuition. It is also not just stationary things but equally events—and, in turn, constellations of events—that are occasions of aesthetic perception” (Seel 2005, 55).

To perceive aesthetically one must transcend the dichotomy of subject and object, and move beyond the being-so of an object or a situation. An aesthetic situation, as Seel describes it, gives “opportunities to perceive sensuously in a particular way” (2005, 21)—more specifically, in a way that reveals that what is brought to its appearing is different from its actual being-so in our perception. Confronted with this difference, we are enabled to attune towards the unfolding of new meaningful constellations in interactive sensual experience, that is, through a synaesthetic attentiveness towards something in its appearing. Besides the involvement of several sense modalities, the attunement towards new meaningful relations, or, as Seel says in the following quote, “rhythms,” the aesthetic mode of perception is also designated by a certain attentiveness towards the here and now. As Seel states, it “is a basic characteristic of all aesthetic relations that in them we take time for the moment, though in entirely different rhythms. In a situation in which aesthetic perception is awakened we relinquish a solely functional orientation” (Seel 2005, 20).

Attuning our senses to the multiple constellations an object appears within relates the perceived to our own life situation. This process is especially present if something appears in an atmospheric way: As Seel affirms, in aesthetic perception of atmospheric appearing, correspondences that are uncovered in the phenomenal field “activate a knowledge of cultural references” in which the perception of something is situated (2005, 94). Besides cultural knowledge and former experiences, acts of imagination in which a different present is fantasized about or remembered can shape the way something is perceived (Seel 2005, 94). Thus, we transcend the conscious

ego-perspective in aesthetic perception: What was, what could have been, and what will be, start to matter:

Facets of this life situation become perceptible to corresponsive aesthetic consciousness. While perceiving, we look into how it is, or how it was, or how it could be to exist here and now, or to have existed there and then. With an alert sense of atmospheric appearing, we perceive our particular concrete, sensuously discoverable situation as a temporary form of our life. (Seel 2005, 95)

The *Oxygenator* might have enabled such an alert sense of atmospheric appearing, because the past, present, and future of the site could not be regarded separately, as the questions raised by the documentation suggest. Additionally, figuratively and literally excavating a traumatic past, the installation surfaced new correspondences between past, present, and possible futures.

By in this way disturbing the accustomed relation to the neighborhood, in blending past and future as well as the lines between the conscious and unconscious, affect and emotional feeling, a social situation was created that also enabled new perspectives on the site. In a "play of appearances," (Seel 2005, 45) the site engaged the life situations of the residents in multiple ways, relating to the past, present, and future of the park in light of the historical events, but also as a context for the synaesthetic experience of oxygen-enriched air, re-directing their attention and enabling in some what might be described as Merleau-Ponty's metaphysical attention. The different ways the residents engaged with the newly designed park, whether they enjoyed the sensuous experience of the oxygenated air, told stories of the past, or aimed to influence the future, reflect for me the involvements with the place they were able to conceive and the possibilities-to-be they derived from those involvements.

At the beginning of this section, I stated that intersubjectivity relies on modes of perception that enable the perceiving subject to recognize a familiarity in the way others are handling the world. I have further asked how we can become familiar with new rhythms in the environment as they register sensual expressions of how we share the world with others, without necessarily sharing sense modalities with those others. The example of *Oxygenator* gave insight into how what we pay attention to influences our actions. To become aware of new meaningful correspondences, it matters how we evaluate the present moment in relation to our past and future. Vice versa, how we see ourselves, how we project ourselves into the future, influences what we pay attention to and what is being ignored. Thus, not only do the bio-chemical make-up of our bodies, the affective dimension of our surroundings, and the cultural contexts we are born into matter, but also what we consider

important for the development of our self. The next section will address the question of how we might become familiar with processes that are outside of our conscious grasp.

Possibilities of Being in Aesthetic Milieus of Shared Concern

If an aesthetic situation brings to appearance additional and potential correspondences in an environment that become meaningful in relation to the perceiver's life situation, then the perceiving subject might also expand its perceived possibilities to act in that environment. An aesthetics of metabolism as it relates something in its appearing on the bio-chemical level of a subject's life-situation can be further elaborated on with Heidegger's notion of attunement.

Attunement (*Stimmung*) is that through which, for Heidegger, the world can be disclosed for Being. It allows human beings to perceive different events in this world as events in the first place (Wallrup 2015, 11). Attunement as such is never an operation of objectification. Instead, it is where the attuned world is allowed to emerge (Wallrup 2015, 10). It follows that, in attunement, humans can reveal how they are in the world and how they can project themselves into the future. Going back to Heidegger, I want to suggest that a sense of the pre-reflective dimension of being that forgoes any objectification can then remain in aesthetic perception, if our being in the world amidst things not only appears as processual and momentary, but also becomes meaningful because of it.

As I already discussed in the previous chapter, Being for Heidegger was to be regarded as spatial ([1927] 2008, 138), which gives ontological meaning to the feeling of belonging to a place. Being in Heidegger's philosophy finds itself when becoming conscious of itself in this way as already being-in-a world. Being is, as such, being thrown into the world; it is being-towards-death. The understanding of our own mortality defines our life as such.

Even though human beings cannot escape their mortality, they tend to forget it, to distract themselves from it. Heidegger called this phenomenon the "inauthentic way of being" ([1927] 2008, 388). In forgetting that Being is being-towards-death, the inauthentic being awaits the future based on assumptions derived from its past; it is concerned with what it *is* and not what it *could* be. It is driven by the "groundlessness and nullity of inauthentic everydayness" (Heidegger [1927] 2008, 223) that prevents human beings from realizing their potential as Being. Therefore, an authentic being-in-the-world can be described as follows:

Rather than living as though they were fulfilling the manifest destiny of some pre-established goals for all mankind, people foresee the world in

terms of incomplete possibility. They care for people and things with the anticipation that lives will continue to be incomplete, marked by possibility and always in need of care. (Scott 2010, 63)

To move beyond the mere present state of things, people, and oneself, the temporality and the finitude of Being must become apparent. Central to my own analysis is that, here, he declares moods as the key to the realization of the temporality of Being: "Having a mood brings *Dasein* face to face with its thrownness in such a manner that this thrownness is not known as such but disclosed far more primordially in 'how one is'" (Heidegger [1927] 2008, 389). Because being-in-the-world is always mooded in a certain way, moods, for Heidegger, can be cultivated. Being has the possibility of cultivating a certain way of life, of turning the passiveness suggested by the *being-thrown* into a more active way of creating one's own life, in the face of death. If the cultivation of moods is closely connected with an openness towards possible ways of life, another central aspect of authentic life enters the picture: care.

Caring is the account for future possibilities: "To live is to care. Broadly understood, to live is to care for our privations or needs, for example, 'our daily bread.' What we care for and about, what caring adheres to, can be defined as meaningfulness. Meaningfulness is a categorial determination of the textured world" (Kisiel 2010, 21). Care, then, can be seen as being expressed in what we pay attention to, what bares meaning for us, which ultimately defines how we come to see our possibilities-to-be (Heidegger [1927] 2008, 402). In clearing (*Lichtung*), knowledge about being becomes possible. As a space of intelligibility, it calls humans to take part in "these events, which appropriate us into the world as a place of significant relations wherein we belong" (Davis 2010, 9).

The "we" that Heidegger addresses here must be considered critically against the background of his political stance. It raises the question of those who are excluded from this "we." If I adopt Heidegger's terms for my conceptualization of a metabolic aesthetics in the following, then I do so in the sense of a radical extension, which includes in a possible "we" human and non-human organisms as well as materials, which are connected by metabolic pathways. Heidegger's notions of mood and care will be regarded more closely in the following section. Aesthetic experience will be considered a mode in which certain moods are cultivated that disclose relations with the environment and make them available to the senses.

In an aesthetics of metabolism, what is revealed is revealed in its transformation, in its already being otherwise. In an aesthetics of metabolism, we would thus rather turn to the soil beneath this clearing, the layer of worms and microbes, the humus of the earth, to become aware of the bio-chemical constitution of living beings. As Haraway, in her non-anthropocentric

vision and pledge for a new cosmology, put it: “We are humus, not Homo, not anthropos; we are compost, not posthuman” (2016, 55). Being humus instead of homo sapiens means, for Haraway, a being with others that shares operations and processes that are central for an aesthetics of metabolism as well: “Critters interpenetrate one another, loop around and through one another, eat each another, get indigestion, and partially digest and partially assimilate one another, and thereby establish sympoietic arrangements that are otherwise known as cells, organisms, and ecological assemblages” (2016, 58). To become aware of the metabolic constitution of being means regarding processes of interpenetration, transformation, digestion, assimilation, and so on as a basis for possible engagements with the world, and, more so, seeking these processes as productive in engaging with others with whom we are sharing the world. If not the humus, to follow Irigaray again, it might be the air that reveals possibilities for metabolic attunements, rather than Heidegger’s clearing.

Although Heidegger had his own at least anthropocentric and elitist agenda that cannot be fully adjusted to a theory of a metabolic aesthetics, which considers bio-chemical processes, I am sympathetic towards the way his philosophy nevertheless shows the human subject as embedded in the world with others and that the nature of this being can never fully be grasped in rational thought. This not only has consequences for the relation of human subjects and their surroundings and the role of pre-reflective subjective experience, but also, for me, ultimately points towards a need for forms of knowledge and practices of engagement that do not reside in rational thought alone. An aesthetics of metabolism can help to assign new value to those aspects of engagement with others that remain intangible, pre-reflective, and latent, but that can be sensed through effects on different layers internal and external to the subjects’ bodies.

Heidegger’s emphasis on care as foundational to understanding Being as being-amidst-others will be expanded and related in the following to the experience of the metabolic dimension that is being shared. In the following, I will propose that the aesthetic sense, as that which relates newly perceived correspondences in a situation to the perceiver’s own life in a meaningful way, can allow for an attunement towards the bio-chemical dimension and the role it plays in this relation. This attunement, I will argue, also reveals the possibilities-to-be that come with the being-with-others that we share metabolic pathways with.

Habits of Care

Why is this revealing of possibilities-to-be relevant in relation to the sharing of atmosphere and metabolic pathways? The intangibility of the ways we connect

with others through sharing the same air is recognized as a crucial factor in discussions about calls for action in the face of climate change and related inequalities. It becomes increasingly clear that what is needed for people to change their behavior and to recognize their role in the global climate crisis is attention as preparation for action. And one way to become attentive to earthly matters and their entanglement with spatio-temporal events is through the development of a caring attitude towards our environment (Puig de la Bellacasa 2017, 41).

Care according to Heidegger, simply put, combines a certain attitude towards one's own being in the world, a pre-reflective knowledge about being embedded in a world shared with others, with an intrinsic anticipation of the future. Heidegger's use of care can be fruitful for parsing out the ways the aesthetic experience of sharing metabolic pathways with others can enable the recognition of a more fundamental interrelationship with the environment than could be grasped by way of rational thought. The anticipated possibilities-to-be that emerge from this embeddedness with others find expression in what I call here "habits of care." In this section, I will elaborate my understanding of both *habit* and *care* in order to transition to the next aesthetic situation, *Urban Algae Canopy*.

I understand habits here, in line with Dewey, as media that direct our attention and that are influenced by former experiences:

[H]abitual attitudes ... govern concrete sensory materials. The medium of habit filters all the material that reaches our perception and thought. The filter is not, however, chemically pure. It is a reagent which adds new qualities and rearranges what is received. Our ideas truly depend upon experience, but so do our sensations. And the experience upon which they both depend is the operation of habits—originally of instincts. Thus our purposes and commands regarding action (whether physical or moral) come to us through the refracting medium of bodily and moral habits. ([1922] 1957, 32)

Habits as media are not pure in this sense—they grow from past experiences and possibly change continuously. As Dewey states, "We cannot change habit directly ... But we can change it indirectly by modifying conditions, by an intelligent selecting and weighting of the objects which engage attention and which influence the fulfilment of desires" ([1922] 1957, 20). Following this, I understand the aesthetic milieus discussed in this text as providing new conditions for experiencing the involvements with the world from which new habits of care might develop. Habits of care that emerge from the experience of sharing a world with others can be understood, then, as practices that support a mutual flourishing, which, in my context, are not necessarily conscious, and include the bio-chemical dimension of being with others.

Care as such is not an unproblematic or innocent term. Caring for something or somebody commonly comes with an idea of some kind of lack, of suffering and the assumption of an ideal state to be attained. To speak with Puig de la Bellacasa again:

Most of us need care, feel care, are cared for, or encounter care, in one way or another. Care is omnipresent, even through the effects of its absence. Like a longing emanating from the troubles of neglect, it passes within, across, throughout things. Its lack undoes, allows unraveling. To care can feel good; it can also feel awful. It can do good; it can oppress. Its essential character to humans and countless living beings makes it all the most susceptible to convey control. (2017, 1)

The origin of “care” in old English is *caru*, *cearu* and means sorrow, anxiety, and grief, as well as burdens of mind and serious mental attention (The Century Dictionary and Cyclopedia 1902). While its literal meaning relates care to registers of emotion and affect, at the same time, it indicates that something or someone is lagging behind an assumed ideal state. Consequently, this assumption of an ideal state that must be achieved can lead to false or disingenuous acts of care that, in fact, turn out to serve ways of subordinating an other to one’s own norm.

As a result, feminist discussions about care have emphasized it as a situated practice that bears ethical and political responsibility. As Haraway puts the political and ethical implications of care into words: “Those who ‘believe’ they have the answers to the present urgencies are terribly dangerous. Those who refuse to be for some ways of living and dying and not others are equally dangerous. Matters of fact, matters of concern, and matters of care are knotted in string figures, in *sf*” (2016, 41).²

As María Puig de la Bellacasa formulates it,

[A] vision of caring, if somewhat too centered on self, speaks of care as those doings needed to create, hold together and sustain life’s essential heterogeneity. In the same direction, most feminist arguments on the ethics of care entail that to value care we have to recognize the inevitable interdependency essential to the reliant and vulnerable beings that we are. (2012, 198)

Understanding matters of care and matters of concern as knots, as forms of relations and ongoing relating that extend ideas of heterogeneity, brings into view the possibility of a sense of care that goes beyond its ontological

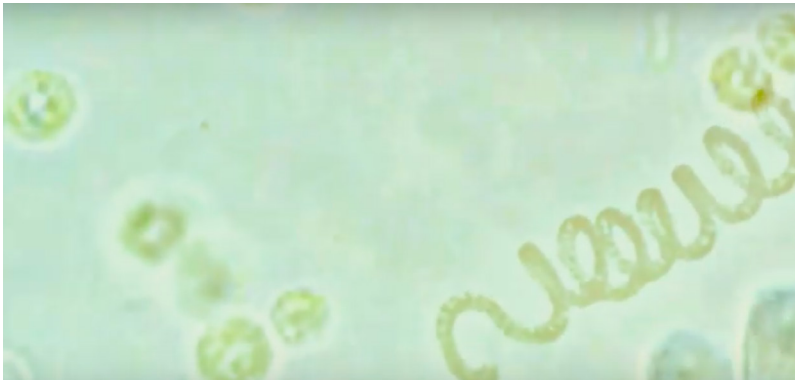
2 Haraway’s use of the initials “*sf*” relate to more than the literary genre of science fiction. She uses it to point towards alternative practices of knowledge formation, such as storytelling and speculative fabulation, as well as cultural practices like string figure games, which is what she mentions in this particular quote.

meaning and becomes a practice that might involve non-human entities as well.

Care as such a situated practice would turn away from the sheer utilization of things and others and the preservation of the status quo towards an openness for those new correspondences that Seel places into the realm of aesthetic perception. The aesthetic sense “as a sense of the potentiality of those realities that we experience or imagine as presences of our lives” (Seel 2005, 99) might enable to see correspondences between oneself and the world that point towards potential new ways of life, new ways of caring, new possibilities-to-be, without putting them to immediate use. Understanding care as a practice then means to critically engage with the ideological power structures that might underlie and direct it. Can an aesthetics of metabolism express involvements with the world as shared with others without assigning a function to the other, without assuming an ideal state or goal of these involvements, of the shared world? This question will be regarded in the next section with the second installation of this chapter.

Urban Algae Canopy

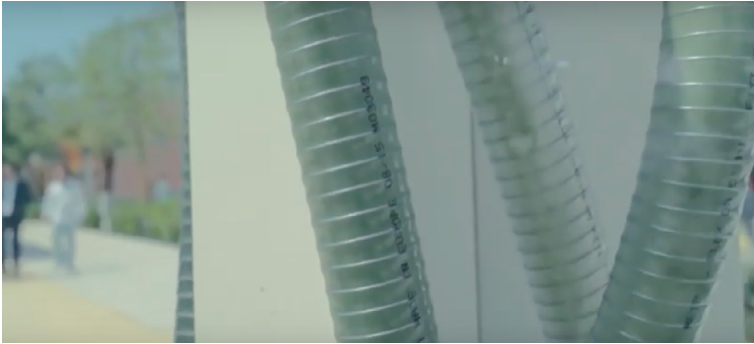
While *Oxygenator* was a site-specific installation, *Urban Algae Canopy*—a design project that was first exhibited at the EXPO 2015 in Milan—is meant to be a prototype for urban areas around the world. It was supposed to have a functional character in urban spaces and could possibly be installed anywhere. As such, *Urban Algae Canopy* is a prototype for a more economical architecture in terms of natural resources. As a hybrid urban infrastructure, it is supposed to help us deal with air pollution and scarcity of resources.



[Figure 8] Ecologic Studio, Urban Algae Canopy, 2015, Expo Milan (source: youtube).

The youtube video in which the design team introduces the piece starts with an animated, flashy-looking intro that focusses briefly on a microscopic view of, presumably, microorganisms, as shown in figure eight.

Then the camera zooms out instantly to focus on a tube, as can be seen in figure nine, through which a greenish liquid is flowing, suggesting that this green fluid contains those micro-organisms we just saw close up.



[Figure 9] Ecologic Studio, Urban Algae Canopy, 2015, Expo Milan (source: youtube).

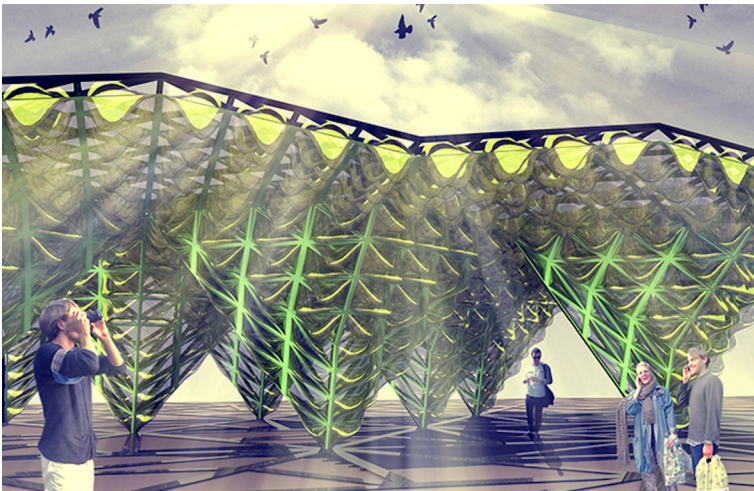
From then on, the camera continues to explore the scenery in close-ups, interrupted periodically by glitch-effects. What we see seems to be an apparatus composed of tubes, through which the green liquid is being pushed, and transparent panels. The video cuts to Marco Poletto (Ecologic Studio 2017, 0'28), one of the two members of Ecologic Studio, the design team behind *Urban Algae Canopy*. While Poletto introduces the piece, the camera moves fluidly around the installation and highlights certain aspects with sharp, partly collage-like edits. In addition to Poletto's voiceover, text runs into the image and provides further information, with style and content that is somewhere between an info board and augmented-reality charts. As we learn, its facets are filled with micro-algae organisms of the spirulina species, which grow and move through the facets depending on nutrient supply and visitor behavior (see figure 10).



[Figure 10] Ecologic Studio, Urban Algae Canopy, 2015, Expo Milan (source: Ecologic Studio).

The designer explains the two dimensions of the project, which is meant to function as an imaginary for a “new industrial evolution” (Ecologic Studio 2017, 2’25 [emphasis added]). On the one hand, the structure is meant to cultivate micro-algae in an urban environment. We learn from the text that runs through the image, as well as from Claudia Pasquero, the other half of the design duo who also speaks in the video, that these algae produce proteins and vitamins and enrich the air with oxygen more efficiently than trees at that spatial scale.

Besides these obvious health benefits, the installation provides a space for relaxation. Individual visitors take a break inside the canopy, enjoy the fresh air, and cool down in the shade, which is a by-product of the algae growth. Mist emanates around the canopy, which not only has a cooling effect on the visitors but also visually suggests a transition into a space that marks a difference with the outer environment. Economically efficient and beneficial for health and wellbeing, algae, Poletto concludes, can be an enriching component of new biocultural infrastructures in urban areas (Ecologic Studio 2017, 2’20). A future vision of the canopy integrated into an urban setting is depicted in figure 11.



[Figure 11] Ecologic Studio, Urban Algae Canopy, 2015, Expo Milan (source: Ecologic Studio).

For my inquiry, it is relevant to consider how the aesthetic of *Urban Algae Canopy* communicates the effects of metabolic processes that were within a temporally and spatially distinct scope. The effects of a present subject’s respiration on the photosynthesis of the algae would not register instantly. Photosynthesis of a plant is not easily phenomenologically perceived by a human observer. The atmospheric condition one encountered inside the canopy was mainly the outcome of the presence of earlier visitors and their exhaled carbon dioxide. Thereby, the visitors left their biochemical imprint

in the form of visual and atmospheric traces in the living environment, which influenced the experience of later visitors.

While the growth of the algae and therefore the air quality and shade inside the canopy depended on the photosynthetic activity of the algae, which was impacted by the carbon dioxide emitted by visitors and weather conditions, additional nutrients were also provided by the designed apparatus. This additional supply secured the growth and health of the algae. The algae growth was furthermore physically connected to the number of visitors, to amplify the effects of their respiration and to make the feedback loop explicit: Sensors inside the canopy tracked the visitors' movements, which further influenced the rate at which the algae fluid was moved through the faucet by means of hydraulic pumps, which also led to visual cues. Thereby, the designed apparatus ensured that the metabolic interrelations between human visitors and algae could be noticed. According to the description of the project website, this feedback loop would even allow one to experience the effects of the interrelations in real time:

[V]isitors will benefit from this natural shading property while being able to influence it in real-time; their presence will trigger electro valves to alter the speed of algal flow through the canopy provoking an emergent differentiation across the space. In any moment in time the actual transparency, colour and shading potential of the canopy will be the product of this complex set of relationships among climate, micro-algae, visitors and digital control systems. (Ecologic studio, 2014)

The way the aesthetic milieu mediates metabolic interrelations here is through the introduction of emergent differentiations that pass different sensuous thresholds: The speed of movement of the algae, the intensity of the light, the quality of the air. To have an experience of these emergent differentiations, they must relate to the perceiving subject in a meaningful way. The potential of newly perceived correspondences here involves the shared metabolic pathways between individual visitor and algae, between other visitors and algae, and between visitors. It also involves the larger environment, the climatic conditions outside the designed apparatus, and the digital technology that mediates between these different agencies. The sensors inside the canopy make interrelations between bodies sense-able—they measure the microclimate to ensure the optimal conditions for algae growth in relation to the number of people in the space and thereby configure a metabolic pathway that would not be possible in this form without digital mediation. The resulting interrelation becomes tangible in its effects on the bodies of the visitors, and, at the same time, it contextualizes the connection in such a way that it can become meaningful, that is, produce sense. In getting such a feel for the correspondences at play that impact one's subjective experience of the canopy, the individual visitor becomes one element within a larger whole, whose

presence nevertheless has a shaping impact on the environment, and, thus, the experience of the canopy that future subjects will have. I will now take a closer look at how these newly perceived differentiations in the environment can potentially enable new ways of acting in it as well.

Expressing Shared Metabolic Pathways

In the following, I will examine to what extent the concept of intersubjectivity is fruitful for thinking about human and nonhuman interrelationships beyond its common limitation to human relationships. Ultimately, I want to relate intersubjectivity to practices of care as they might develop in a heterogeneous, multi-species milieu such as *Urban Algae Canopy*. The appeal of the concept lies in the fact that it places knowledge outside of a cognitive frame that is attributed solely to human actors. Intersubjectivity, therefore, makes it possible to consider knowledge without relying on pure consciousness and thus might grant an aesthetics of metabolism a status as a form of knowledge. If we consider aesthetic perception as a function of intersubjectivity, even if it is not reducible to that, it could be thought of as relating something in its appearing to the perceiver in a meaningful way that can be shared with others. An aesthetics of metabolism might then extend this shared pre-objective, pre-reflective meaning towards the bio-chemical dimension of our being in the world. Let me explore the implications of this proposition more closely in the following. Intersubjectivity is the process by which the subject transcends itself in its temporality; it is always *thrown outside of itself*. Only in understanding this self-transcendence, in Merleau-Ponty's sense, as a fundamental openness towards others and to the world can we explain how "the presence to myself", which establishes my own limits, and conditions every alien presence, is, at the same time, "derepresentation" and throws me outside myself ([1945] 2012, 381). He continues:

Since my living present opens up to a past that I nevertheless no longer live and to a future that I do not yet live, or that I might never live, it can also open up to temporalities that I do not live and can have a social horizon such that my world is enlarged to the extent of the collective history that my private existence takes up and carries forward. The solution to all the problems of transcendence is found in the thickness of the pre-objective present, where we find our corporeality, our sociality, and the preexistence of the world, that is, where we find the starting point for 'explanations' to the extent that they are legitimate—and at the same time the foundation of our freedom. (Merleau-Ponty [1945] 2012, 457)

Following Merleau-Ponty here, one can state not only that there is a pre-reflective dimension in which our corporeality and sociality—the being-with the world—is located, but also that the world itself exists independently of

the mind. If there is a pre-objective present that we are interrelated with through the dimensions of our bodily and social being—that is, a present that opens up to a world we are always already embedded in—then it is from this pre-reflective embeddedness that all explanations, all knowledge, is derived. Here lay, for Merleau-Ponty, the possibility of freedom for the subject. Freedom not in the sense of “free will,” but rather as the freedom from ideological and biological determinisms. Human subjects, in this view, inter-become: They are intertwined in a pre-objective present that is not without limits but does not determine their becomings either. It is this freedom from biological determinism that allows one to open up possibilities-to-be, to conceive of something in its potential further becoming and not as a fixed being-so. Considering this pre-objective present, then, would make impossible the mere utilization of the other and would instead enable ways of caring that aim to sustain “life’s essential heterogeneity” (Puig de la Bellacasa 2012, 198).

The following sections will examine how an aesthetics of metabolism could enable such an experience of the shared pre-objective present through expressing shared metabolic pathways. Metabolic processes, as they transform matter and energy, not only penetrate bodily boundaries. Through metabolic processes, our bodies take the world inside themselves; it travels through our lungs, our digestive organs, only to be expelled again in material or energetic forms at a later stage, through which our bodies become part of the world yet again.

Can such a basic operation of living processes be disconnected from its underlying purpose, which is, in fact, to utilize and to transform in order to maintain conditions for living processes? Can a metabolic aesthetics be free from biological determinisms? My argument has been that an aesthetics of metabolism, to refrain from an objectification of an other, has to express the effects of a foundational *being-with* that cannot be identified with an origin but remains processual in sensuous perception. In my examination of this concept in the context of *Urban Algae Canopy*, I have analyzed both the characteristics of objectification and the possibilities for attunement at play. On the one hand, biological determinisms remain intact; the functional aspect of the algae and the designed apparatus of the canopy subsume the pre-objective present into an ideal, human-centered vision. As the design-team highlights: “Once completed, the *Urban Algae Canopy* will produce the oxygen equivalent of four hectares of woodland and up to 150 kilograms of biomass per day, 60 percent of which are natural vegetal proteins” (Pasquero and Poletto 2014, 3).

The structure aims to utilize productive processes in living organisms for the benefit of urbanites. This understanding of organisms or natural processes as forms of labor is typical for the conceptualization of environments through the design principle of ecosystem services. An aesthetics of metabolism proposes an alternative way to think about the relation between humans and

their environments, an alternative needed to refrain from the continuous exploitation of earthly resources. The canopy as an example of an aesthetic milieu serves me to show that the possibility of shifting our attention to processes of interrelation with the environment is given even in a context that builds upon the old binarism of nature and culture. That is because the intention of the designers is only one factor at play. The agency of the algae, the sensing technology, and the bodies of the visitors continuously co-create this context of experience. The assemblage of living cultures, sensing technologies, and visitors form a communicative structure that brings complex interdependencies to experience, by way of visual changes, changes in the air quality, and increasing or decreasing of shade. Correspondences between the bodily presence of visitors and those of other, also non-human, entities and environmental effects are made sensual inside the canopy. This might lead to a re-evaluation of the role metabolic processes like transformation or interpenetration play in the constitution of what are considered livable conditions. The project thereby offers different ways to direct sensuous attentiveness, which can move between the algae as a perceivable object, as a resource, to the processes of their becoming as sensitive organisms. Attending to the processual aspects of the interrelations with our environments shifts our attention towards the intensities that underlie them, which come with different effects on the body of the observer and make the body of the algae appear as an accumulation of forces rather than a fixed object (Braidotti 2006, 157).

In the following, I will repeatedly return to the notion of intensities, and thus a brief contextualization is in order. *Intensity* as a term relates to different semantic categories. In physics, it can refer to the high level or degree of a thing, such as temperature or electromagnetic radiation. It can also refer to feelings or actions of subjects, categorizing emotions as deep, *intense* (Klemm 2010, 349). This semantic heterogeneity makes the term particularly valuable for a perspective that wants to think biological and cognitive processes together. According to cultural theorist Gernot Böhme, properties such as intensity occur in all sensory modes (2013, 48), which makes intensity crucial for an aesthetics of metabolism, as it allows us to go beyond the reference to perceptible phenomena and includes sensual experience as well. I will return to the role of intensities as part of an aesthetics of metabolism later in this chapter.

Given that attunement is linked to intersubjectivity, a question that follows now from the exploration of the two installations is, given that attunement is linked to intersubjectivity: Can an aesthetic mode of perception lead to an intersubjective response in the subject towards others who are not necessarily human or present to the senses in the first place? The proposition will be that a metabolic aesthetics reveals interrelations among and with other

organisms that do not come to full appearance but can be understood as experiencing nevertheless. This experience by the other is linked to shared metabolic pathways and can be sensed by the visitors in the form of varying intensities of qualitative aspects that register in the shared environment. In order to understand how an attunement to spatial and temporal scales that are not primarily human relates to those intensities that are part of processes that come to form objects in human perception, I will first consider a perspective that would be able to perceive emergent differentiations in the environment as meaningful, without the necessity of identifying a cause or having a representation of its meaning. This perspective will be explored as that of a decentered subject, a stigmergic subjectivity.

Attuning to Metabolic Processes in Shared Environments

Stigmergic Environments and the De-Centered Subject

Stigmergy as a concept was first applied to the study of insect colonies like ants and termites in order to understand the way they use the environment to transmit information. In general, this concept, coined by entomologist Pierre-Paul Grassé (1982), describes a mechanism of coordination that is used by not only insects, but also other networks, including human networks. As such, stigmergy grew as a concept that now entails cooperation and self-organization in large groups—as in human organizations, swarms, or animal colonies—in which the agents communicate through changes in the shared environment.

The feature of stigmergic environments that made it attractive for human contexts of organization at the level of labor management is that the local individual is able to act within global complexity without being overwhelmed—because every agent in a stigmergic environment acts at a localized point within a larger network:

[I]n a stigmergic process local agents with limited knowledge and resources are not overwhelmed with global complexity, as they are exposed to optimal information load and problem solving which requires only simple actions. Self-organization of local interactions can yield a coherent systemic outcome that provides required control in the hands of local agents, who are unaware of the global problem as well as the impact of their own actions on it, and at times, even of the actions of their local peers. (Sharma and Patil 2017, 2888)

Local agents therefore act on perceivable marks in the environment without the necessity of knowing how these marks or their action that follows the marks relate to any kind of larger context. The action itself, in fact, leaves a

mark in the environment, and re-shapes an aspect of the environment that stimulates further actions.

While stigmergy is a general mechanism of indirect coordination, in insect colonies, it often serves to enable forms of communication between two species. In symbiosis, that is, a relationship between two species that is beneficial for both, stigmergy allows, to a certain extent, for one species to care for the wellbeing of another species. I will clarify this in the following with the example of the mutualistic relationship between *Atta* ants and *Lepiotaceae* fungi. The ants cultivate the fungus in their nests, prepare compost for it, and regulate nest ventilation to maintain the optimal climatic condition for the fungus to thrive. At the same time, the fungus serves the ants as nutrition.

What makes this case especially interesting for the context of my writing is that the ants seem to have developed a sensitivity to the meaning of the environmental conditions for the fungus, recognizing and acting upon critical levels of oxygen for their mutualistic partner. The ants have learned to become sensitive to patterns that express processes that are not of immediate importance for them, but that would endanger the health of the fungus—and therefore their own species in the long run. As biologists Daniela Römer, Martin Bollazzi, and Flavio Roces have observed, the ants seem to “avoid both atmospheric and high CO₂ concentrations not because they are detrimental for themselves, but because of their consequences for the symbiotic partner” (2017, 1). The balance of this partnership is guaranteed by the constant observation of the chemical composition of the atmosphere by the ants.

In concrete terms, these acts of observation and manipulation of the shared environment can take the following form: If the carbon value within the atmosphere of the nest changes towards a critical state for the fungus, the *Atta* ants increase nest ventilation by changing the structure of the nest itself. They thus use CO₂ as a parameter to maintain the optimal atmospheric composition for the fungus and avoid harmful levels of CO₂, customizing the shared environment accordingly. Patterns that do not concern the individual ant generation directly but do concern the colony as a whole become significant. Thereby, as biologist Francis Heylighen argues, a different notion of agency, or, to translate it into the context discussed here, subjectivity, is enabled:

[T]he concept of agent is not strictly necessary for a definition of stigmergy ... the mechanism applies perfectly well to the coordination of actions performed by a single, unspecified agent, in which case there is no need to identify different agents. Moreover, further extensions of the stigmergy concept may even do away with the notion of agent altogether, and consider the coordination of ‘agentless’ actions that are merely events or physical processes—such as chemical reactions. (2011, 5)

What counts in stigmergic environments is how the environment communicates the need for action. This is possible because the environment, over time, forms a connection between certain changing parameters, like oxygen rates and the living agents involved, that can be sensed.

Taking this argument further, one could state that the environment of the ants' nest serves to communicate and regulate the mutualist organism-environment relation that expands past the current moment in time and thus becomes anticipatory (Heylighen 2011, 2): The environment expresses patterns that communicate changes in the atmospheric composition from which the ants deduce the necessity to perform anticipatory actions in order to secure the continuous wellbeing of the fungus. At the same time, the environment is a medium that itself expresses a climatic condition and is actively transformed by the ants to communicate necessary actions. The shared environment could, in fact, be seen as part of a superorganism formed in the mutualistic relationship.

Studies on stigmergy often stress that we can understand the body of an organism itself as a stigmergic environment as well, in which the different organs, the nervous system, and so on communicate necessary actions to maintain the system as a whole: "[D]ifferent physiological processes in the body communicate via the release of hormones in the bloodstream (medium). This communication is indirect: e.g. the liver does not directly send a message to the brain; both merely 'read' the hormonal messages deposited in the blood that irrigates both" (Heylighen 2011, 7). In Uexküll's terminology, this refers to the inner environment of an organism that embeds it in the outer environment. However, what becomes crucial when we look at stigmergic coordination between different species, such as that between *Atta* ants and fungus, is the question of how this coordination can take place when both species are idiosyncratically embedded in their respective environments. A condition for stigmergic coordination between species must thus be that a dimension of the respective environments is shared and that the effects of the processes within these dimensions on the one species are mediated to the other (Heylighen 2011, 7).

In the *Atta* ant-fungus mutualism, one elementary medium that is shared, in this way, is air. The varying degrees of oxygen in the air can be sensed and managed by the ants through ventilation. In this sense, medium means at once an intermediary that makes change available to the senses and the very element of change. Instead of understanding the actions that respond to the sensuous patterns mediated by the air as reflexive and automatic, I want to propose regarding them as habits of care. To care for a shared stigmergic environment, then, does not presuppose that everyone has the same information or the same experience of relating to the world; nor does it depend on a conscious ego or centralized control system. It is a way to think of agency as

distributed and localized at the same time. Could we understand stigmergic communication across species boundaries analogously to intersubjectivity as it interrelates human subjects? Would a stigmergic subjectivity allow us, consequently, to become sensitive towards nonhuman organisms with which we are sharing metabolic pathways? In the next section, I will explore the potential of aesthetic experience to respond to these questions.

Urban Algae Canopy as a Stigmergic Environment

Could we see an aesthetic milieu such as *Urban Algae Canopy* as a stigmergic superorganism? Stigmergy was, in fact, an inspirational model for the design of *Urban Algae Canopy*, as the design team states:

Ants communicate through the pheromone traces they leave, which respond to local environmental conditions like evaporation rates. The environment is internalised in these communication systems; no overall planning exists and there is no top down communication strategy, only a continuous form of local adaptation and feedback mediated by the environment. This means that overall coordination and decision-making take place as an emergent property of the colony's behaviour within a specific milieu and any transformation that affects the environment is automatically registered. (Pasquero and Poletto 2014, 1)

The importance of local action for the whole of complex systems finds its actualization in "living test beds" (Pasquero and Poletto 2014, 2) like *Urban Algae Canopy*. The urban vision behind this approach is to build cities that evolve over time, integrating mechanical and biological aspects and being able to react flexibly to events on different scales.

In introducing the biological principle of stigmergy, I proposed a different notion of care for an other that is based on a shared medium like air. More than a shared dimension that interrelates the respective environments of ants and fungus, the different organisms also share a structural similarity: metabolic operations that enable both species to process oxygen in the first place. Even though these processes are not identical, they allow the two species to share the same environment and the ants to detect critical CO₂ levels that might endanger the fungus. I want to think about this sharing of environmental dimensions in the following as a structural and processual *with-ness* from which all subjectivity emerges. For this, I will return to Whitehead's process philosophy and his notion of prehension. In prehension, there is no dichotomy between subject and object, because subject and object emerge in the process of prehension. Therefore, prehension allows me to speculate about how an aesthetics of metabolism could express traces of involvements with others, without identifying these traces with something fixed. I will propose aesthetic milieus to give rise to a sense of caring for a shared

environment that comes with a familiarity with effects of processes, which themselves never become tangible.

Aesthetic Experience of Process

A central term in Whitehead's philosophy is "prehension." It can be defined as "a primitive form of 'apprehension' meant to indicate a 'taking account of,' or 'feeling,' devoid of conscious awareness" (The Cambridge Dictionary of Philosophy 2009, 972). Prehension for Whitehead is the way in which something—an entity, occasion, a pattern—is felt by a prehending entity as compatible. To understand this operation, we have to first look at Whitehead's understanding of the body, which has some similarity with Merleau-Ponty's concept of the lived body:

[O]ur bodies lie beyond our own individual existence. And yet they are part of it. We think of ourselves as so intimately entwined in bodily life that a man is a complex unity—body and mind. But the body is part of the external world, continuous with it. In fact, it is just as much part of nature as anything else there—a river, or a mountain, or a cloud. Also, if we are fussily exact, we cannot define where a body begins and where external nature ends. (1938, 21)

In this passage, Whitehead makes clear that we mistakenly identify the individual experience of our bodily existence as that of an individual being opposed to the world. Instead, he argues, our body must be seen as always part of the external world and outside of our conscious grasp. Not being opposed to the world, the self is extended in a nonconscious way towards its environment, which constitutes a primordial withness with the world. This withness is constituted by the operation of prehension: an occasion of experience becomes part of the experiencing subject.

An encountered occasion is taken in, is modified, and thereby exhibits the "influx of *the other* into" the subject. Prehension is a process whereby all entities that participate in the encounter undergo change:

[T]he present occasion while claiming self-identity, while sharing the very nature of the bygone occasion in all its living activities, nevertheless is engaged in modifying it, in adjusting it to other influences, in completing in with other values, in deflecting it to other purposes. The present moment is constituted by the influx of the other into that self-identity which is the continued life of the immediate past within the immediacy of the present. (Whitehead [1933] 2010, 181)

Within Whitehead's highly complex ontology, prehension takes on a far greater role that I cannot do justice to at this point. In favor of my own argument, I choose not to go into the connection of prehension with temporality and other

aspects of becoming. Instead, I want to make the concepts of bodily witness and prehension productive to explicate being-with the world from a metabolic perspective. A first step is to conclude that the elements in our perception that are clear to conscious awareness are not conditional facts. They are derived modifications that emerge from continuous processes of sense-making. As the subjective form of an intellectual occasion, conscious awareness does not just single out pre-conscious elements from a background of experience and bring them to the fore. Becoming consciously aware is a process of modification from which both subject and object emerge (Whitehead [1929] 1985, 162).

Before, I suggested that the mediation of processes in the installation of *Urban Algae Canopy* objectifies the algae. Now I seem to suggest that the emergent differentiations that registered the metabolic interrelations between visitors and algae must express a structural similarity that the perceiver can relate to, in order to attune to a shared stigmergic reality. Is this a contradiction? Not if these emergent differentiations can be sensuously perceived while at the same time remaining processual in their appearing. The question I want to address here is therefore not, how we can free the relationships to our environments from representation but what other representations can we imagine that account for difference in greater detail? This brings me back to the question how emergent differentiations in *Urban Algae Canopy* become sensuously perceivable in the first place.

Again, Whitehead's philosophy offers a perspective here: In philosopher Isabelle Stengers' understanding, Whitehead's witness should not be understood as a monodirectional extension towards a world. As Stengers points out:

We enjoy a world, including the feeling of our own body, even if we are not usually conscious of it, even if we have only vague words for it. Such words must be carefully fabricated if the elucidation of our experience is not to stop with the wonderful efficacy of the sign. However, if such enjoyment is restricted to human embodied experience, we return, again, to the bifurcation of nature. The poet enjoys the beauty of the nightingale's song but the nightingale enjoys nothing. (2014, 56)

How can we re-think this scene in a way that the poet's enjoyment of the singing nightingale does not turn the nightingale into a mere object of experience? How can the experience of the oxygenated air in the installation be more than an enforcing of form onto a natural phenomenon by a human actor? Can Whitehead's concept of prehension provide a theory that explains how we can come to share a form with processes on scales usually not accessible to us?

In Whitehead's terms, we would be able to sense the similarities in the metabolic dimension because we form a *society* with them. *Society* is used by Whitehead to define an order in nature that allows for enduring objects. As

such, enduring objects as they appear to us in perception are, in fact, formed through a society of actual occasions. Cells and molecules are societies just like a stone, or a community of human beings (Whitehead [1929] 1985, 98). However, Whitehead points out that there is no such thing as order as a fixed state. Order must always be understood in its reference to disorder (Halewood 2014, 362).

As social scientist Michael Halewood explicates this point by Whitehead:

What is social about social order therefore involves the notions of form and prehension. The term 'form' refers not to some realm of ideal Platonic forms (which actual entities or societies aim at) but the manner in which actual entities mutually prehend or grasp each other, thereby establishing a consistency that enables them to be, to endure, and to be recognized as a coherent 'individual.' (2014, 366)

Prehension not only enables a relation; as negative prehension, it can also prevent a relation. For positive prehension to be possible, there has to be a structural element that forms a relation between the prehending occasion and the prehendend one (Whitehead [1929] 1985, 26). It has to fit. Therefore, in order to attune to the biological dimension of our biocultural environments, we have to attune to the *bio-* of our own biocultural being.

In sum, society can be understood as a togetherness of entities, a togetherness based on the sharing of form. This form is expressed in each entity that is part of the society, and it arises due to shared conditions that in some way support the endurance of this form, through positive prehension, in which an occasion is taken into the composition of the prehending entity. Therefore, for an attunement towards metabolic processes in a shared environment, it is not enough that we have a concept of metabolic processes, that we know about the photosynthesizing algae. It is not enough to rationally understand that an environment like *Urban Algae Canopy* structurally integrates metabolic processes. In order to sense the effects of the interrelations of the biological patterns of metabolic processes, to understand how they embed us in a place, the aspects of structural similarity have to be felt. This feeling and sensing of metabolic relations can then be reflected upon, and our knowledge about the design of the canopy can be connected to our own life situation in aesthetic and lived experience.

In the following section, I will explore how we would come to experience the sharing of a form in *Urban Algae Canopy*. Ultimately, the question is, how aspects of this witness or togetherness with the algae can be expressed in such a way that they are integrated into the formation of conceptual thought about the canopy. This will give me the opportunity to suggest what is necessary for attributing a certain form of subjectivity to a non-human other, to which we then inter-*subjectively* attune.

Intensities as Marker in Stigmergic Environments

The intensity of certain biological processes in a body, say, the production of serotonin due to changes in oxygen levels in the air, has certain effects on feelings and thoughts. The subject might feel a sense of euphoria if serotonin levels go up. How the environment can impact processes on the hormonal level of our bodies—which leads to emotional and cognitive responses that we might become aware of in the form of feelings—shows that our surroundings, our bio-chemical and cognitive dimension, cannot be regarded separately. Rather, the reciprocal effects that processes in those dimensions have on the others designate nodal points of processes, which are formed by intensities on different levels and can potentially be sensed in different ways. Intensities allow us to understand better how prehension differs from a conscious reference to the world and therefore allows me to formulate how an attunement to shared metabolic pathways in aesthetic perception is possible without the need to objectify what it is that is shared. This is because, in prehension, instead of perceiving something in its being-so, that something is taken in through a “blind feeling,” to quote Marie Luise Angerer, in which perception and sensation are “divorced from the category of an intentionally acting subject.” (2017, 39)

In removing the first syllable from *apprehension* (the cognitive or intellectual act of grasping an idea) to describe, with *prehension*, a noncognitive way of grasping, Whitehead opposes not only an idealistic focus on abstract thought but also the exclusive reliance on sense-perception. As philosophers Adam Nocek and Nicholas Gaskill point out, Whitehead’s turn towards “... perception in the mode of causal efficacy (the vaguely felt process by which the past enters into the constitution of the present) meant to turn our attention to how these modes diverge, combine, and gain relevance in relation to particular questions about knowledge and experience” (2014, 13). Whitehead’s philosophy does not only offer an alternative to a solely phenomenological approach in which it would be assumed that an object can be perceived as such via its sensory qualities. For Whitehead, sense perception that gathers such qualities of an object is only one part of the process of perception. The qualities that are considered to “create a *feeling* in the subject,” as he puts it, and that are further integrated into the meaning-making process of perception, varies. In this way, considering vagueness as a meaningful part of experience gives a new perspective on the possibilities of meaning-making within processual environments, making meaningful experiences that escape a clear depiction as a *what*.

The clear depiction of a *what* in conscious reference to the world can be understood, in line with Whitehead, as following a process of combining sensory perception and identified causality. What Whitehead criticized was the assumption that the outcome of this process—symbolic reference—would

reflect reality. In the following, I will briefly describe the role intensities play in this process in order to explain how the intensification of metabolic processes in *Urban Algae Canopy* not only enriches synaesthetic experience in the aesthetic milieu, but also allows the sum of the sensory impressions to lead to the perception of a new context, and ultimately a new perspective on the role the perceiving subject itself plays in it.

According to Whitehead, the vague has its place before the clear distinction of a perceiving subject and a perceived object. For the feelings created in the modes of causal efficacy and presentational immediacy to be combined and form a distinct object, an aspect must stand out that makes it possible to connect the feeling that arises in presentational immediacy with that of causal efficacy. In order to stand out, it has to be intense enough. Whitehead uses the example of a gray stone: Simply put, for a gray stone to be perceived as a distinct object, the two modes of perception must identify and bring together those aspects that are necessary to identify the object as a gray stone. Whether the color gray is included in this process as a characteristic for identifying the stone is a question of intensity: If the light, for example, is reflected by the stone in a way that it just as well might be black or brown, then the color would either not play a role in the process of identifying the stone, or the subject would assume the color that is most likely, based on previous experience. If the subject has seen mainly black stones in the region where the stone is from, the subject would most likely perceive this particular stone as black as well.

While the perception of the stone is, on the one hand, shaped by expectations, it also depends on the relationship between the stone and its surroundings. In an experiment, anthropologist Tim Ingold took the perception of the materiality of a wet stone and how it changes in relation with the surrounding atmosphere as the starting point for his inquiry. He proposes that it is through witnessing the changes visible on the surface of the stone that come with the process of drying,

[that we are able to] ... switch our attention from the stone as a material object to what happens to stone—a material—in the course of exchanges of substance across its surface with the surrounding medium of air. In place of the material world, populated by solid objects, our eyes are opened to a world of materials, including earth, air and water, in which all is in flux and transformation. (Ingold 2011, 16)

What becomes sensually tangible is the result of an ongoing process that interrelates materials—here, those of the stone. And, while being a material itself, air can play the role of a medium in this process. For Whitehead, the fact that we can perceive the color of the stone depends on the stone's surface properties that contribute to the wavelengths in the light reflected

by it, the ambient illumination, and other objects present in the perceptual field. The interplay of these aspects determines whether the color appears intense enough to be perceived. Intensity thus turns the vague into something distinct:

The two modes are unified by a blind symbolic reference by which supplemental feelings derived from the intensive, but vague, mode of efficacy are precipitated upon the distinct regions illustrated in the mode of immediacy. The integration of the two modes in supplemental feeling makes what would have been vague to be distinct, and what would have been shallow to be intense. (Whitehead [1929] 1985, 180)

Intensity, in this sense, is the central mode of expression by which it is possible after all that we perceive something as a distinct object. Intensities guide, or direct, or structure the combination of feelings created in the modes of presentational immediacy and causal efficacy.

In order to perceive the structural similarities between humans and algae that allow them to share metabolic pathways within the canopy, certain aspects of theirs have to come to the fore, and to be intensified in sensual experience in order to become part of the interpretive part of the experiential process. A number of processes that constitute perceivable phenomena register in the aesthetic milieu of *Urban Algae Canopy*: The changes in air quality, light intensity, and hue happen without ever forming an end-state or suggesting an original state. The differentiations become perceivable because they cross certain thresholds and change their intensity.

Thus in *Urban Algae Canopy*, different levels of intensities play a role—not only in the interoceptive sensing of internal processes of one’s own body, but also in sensing how levels of intensities in processes external to our bodies leave marks in the environment, thereby rendering the environment itself sensitive. In becoming familiar with the ways different intensities of emergent differentiations in the environment relate to one’s own spatial presence, an awareness of the metabolic dimension of our own being might develop. But, to come to the second main question in this chapter, how would this lead to new habits of care that could make this awareness for the metabolic inter-relations describable?

Care for Future Possibilities

In this last section, I will return to the question of how we might develop habits of care for others in shared environments, even though those entities with which we share the environment might have a different experience of this relation, different needs, and sensual capacities, and might withdraw from our phenomenological grasp. What would be necessary for a shared concern

for environments based on the bio-chemical dimension of our being, I argue, would be a belief in the *potential* of a relation, a trust in a possible future that grounds itself on such interrelations. Our everyday encounters are filled with opportunities to shift our attention to such interrelations. Design projects like *Urban Algae Canopy* can serve as an example for a condensation of the continuum at the root of these interrelations. While the encounter with the algae is meant to blend into a design intended primarily for human wellbeing, the potential for the encounter of difference is given in the dynamic connection between algae, atmosphere, and visitors. The assemblage of entities always holds potential for affections and the formation of new relations that do not comply fully with the imposed design purpose. It is therefore a question of identifying the aesthetics of metabolism in everyday experiences and not, first of all, of creating new design strategies according to this model.

How could such an engagement that allows for a sense of potentiality to develop, a witness that includes a nonhuman other, evolve in aesthetic milieus like *Urban Algae Canopy*? To propose an answer to this question, I reiterate Vinciane Despret's notion of care as an "anthropo-zoo-genetic practice."

Despret explores how an experiment that involved a professor, his students, and lab rats uncovered how beliefs can create certain habits of care that enable new identities—for the students and the rats. In this experiment, the professor told one group of students that they would handle rats with high intelligence, while another group was handling rats that were supposedly less intelligent. This distinction was not true—the professor wanted to find out if the expectations of the students would influence the outcomes of their studies. The students were supposed to train their rats to solve certain puzzles, like navigating a maze, and, at the end, it became clear that, indeed, the rats that were expected to be intelligent performed better than those expected to be dumb. As Despret concludes,

These emotional relations, made of expectations, faith, belief, trust, which link each rat to each student, disclose the very essence of the practice: this is a practice of domestication. As long as this practice proposes new ways to behave, new identities, it transforms both the scientist and the rat. Both the student and the rat transform the practice that articulates them into what we may call an 'anthropo-zoo-genetic practice,' a practice that constructs animal and human. (2004, 122)

These practices of domestication are practices of care—of believing in the possibilities-to-be of the other that have a transforming effect on both the caring scientists that become good scientists and the "bright" rats that manage to solve the puzzles faster (Despret 2004, 122).

Understanding care such as an anthro-zoo-genetic practice might first seem like a backwards movement into reductionist theories. But instead, Despret proposes here a pragmatic way to acknowledge a becoming-with-others, given the fact that the other—just as the self—can never be fully grasped or predicted. In her example, both the rats and the students change, and they effect each other in ways that are not fully revealed to rational thought. This becoming with others, the inflicted change inherent to all engagement with an other, and the mutual domestication that lies in the affectivity and the ability of both rats and humans to be affected, becomes foundational in thinking here about interspecies-becoming.

It is thus the assumption of a potentiality that determines the shared becoming and that restricts while, at the same time, facilitating the affective impact of the relation. Believing in the others, Despret's continues, must be seen, "not in terms of 'what they are,' but of 'what they make'" (2004, 122). Belief, then, is that which "makes entities 'available' to events" (Despret 2004, 122). Possibilities-to-be and to become-with-others can then be opened up by the experience of the effects of actions: In *Urban Algae Canopy*, the effects the visitors, the algae, and the digital apparatus have on the shared metabolic pathways are *made* by those different bodies. By aesthetically experiencing shifts in intensities accompanying these correspondences, we might come to see ourselves as caretakers of a shared environment instead as being masters of it (Despret 2004, 124).

The dependence on how the human subject conceives itself—as caretaker or master—assigns two different notions of agency to the other, as Despret explains: "In the first case, the animal is what articulates the system, in the other, it is the system that articulates the animal, which just has to show how it obeys laws" (2004, 124). The first case accounts for complexity, for novelty produced within the system, and thus new possibilities of prehension and possibilities-to-be for all entities involved. Following this, I suggest that, if in *Urban Algae Canopy* we come to believe in the impact of the algae on our own wellbeing, in the impact my own respiration has on the experience of others and vice versa, then this might lead to different manners of being-in the environment, a taking-care for those shared intensities that make up the shared world.

Prehension as that operation that enables one to form novel interrelations with others, to identify new values in the environment for the actualization for possible futures, here can be related to what Despret calls attunement. She states that,

[The practices of domestication] ... are practices that create and transform through the miracle of attunement. This miracle of attunement ... radically changes the question we may address to the body. If we are

forced to give up on the issue of 'what a body is,' our access leads us to question it in quite a different manner. All our examples raise the same problem: what the body makes (us) (others) do. And as all our examples suggest, this body that 'makes one make' is primarily articulated by affects. (Despret 2004, 125)

Domestication, in this sense, is not to be understood as forming and oppressing an other. Rather, the mutual enaction of a shared reality, a becoming-with-another, is highlighted, in which processes of interpenetration and mutual transformation are inherent. These affects that articulate how "bodies make bodies do" can also be understood through Whitehead's prehension: Through prehending an other, this other becomes a structural part of the prehending entity.

If we relate this to *Urban Algae Canopy*, we could think of it as a stigmergic environment that enables the experience of the registering of shared metabolic pathways as an expression of our own bio-chemical dimension, as it constantly interrelates with the vegetal life around us. If we came to see our sensate environment as the co-product of these shared pathways, we might also become able to take on a perspective from that bio-chemical dimension itself and ask what matters in it. In this way, as Despret states, we would not only raise the question from the point of view of the one to whom the question is addressed (the algae, in our example). More than that, we would activate this point of view of the algae, and thus activate our object as a subject. This would change our own identity and would, to speak along with Whitehead, enable us toprehend an other that, in this way, becomes part of our own constitution. If aesthetic milieus such as *Urban Algae Canopy* can provide ways of attuning to non-human others and other humans, in making the shared bio-chemical dimension sensually perceivable, we might come to develop a concern for the needs of that other. Just like the *Atta* ants activate the fungus as a subject, and thus become able to act in the fungus's presupposed interest, we might begin to act in the interest of the algae, presupposing that they are part of a shared environment. Dwelling in shared multi-species environments, then, might mean becoming familiar with the effects of interrelations that might not make direct sense to the individual subject but that merge into an overarching, or rather, an infrastructural perspective on being in the world that includes pre-reflective, non-human aspects, and the strangeness and uncertainty they bring with them.

The Shared Experience of Metabolic Processes

My exploration of two installations in public space that use oxygen as a liminal affective technology to intensify existing interrelations between humans and their environment, and to enable new ones, has led me from a discussion

of intersubjectivity as the condition of our being always outside ourselves towards the de-centered subject in stigmergic environments.

In my engagement with *Oxygenator*, I have focused on the interconnectedness of atmosphere in the material sense and as a social co-construct, through which a place transmits a certain feeling, invites us to certain actions or to linger. I have pointed out that, to relate changes in an environment to one's own life situation, and to have an aesthetic experience of how these changes involve the individual subject with the place, the mere awareness of such changes is not enough. In developing new ways of engagement with the place and new possibilities of acting in it, the residents of the neighborhood in which the installation was placed began to engage with invisible matters as well—with the history of the place, its future, and the potential health benefits of breathing the oxygenated air. Thereby, new meaning can be assigned to aspects of engagement with others, which remain intangible, unconscious, and latent.

Discussing the situated and distributed consciousness of stigmergic subjectivity revealed an aspect of aesthetic perception that emphasized the importance of care as a driving force for the perception of potentiality. Care was further discussed in accordance with a sense of futurity, of the necessity to derive possibilities-to-be from present relationships in order to project a future for the caregiver and the one being cared for. Crucial for this futurity that includes the sense for sharing an environment with others is the attunement towards aspects of a structural similarity of that relation.

In *Urban Algae Canopy*, this structural similarity lies in the shared metabolic pathways, whose effects were mediated by the aesthetic milieu. These possibilities of attunement are not limitless, as Whitehead's concept of prehension shows: The operation of prehension as attuning towards an occasion and taking it into one's own composition follows a pre-existing structure that enables the relation in the first place. To allow for an attunement towards those common structures in metabolic interrelationships within an aesthetic milieu means intensifying sensual qualities of mutual affects.

These structures have been brought to the fore in *Urban Algae Canopy* as the metabolic interrelations of bodies and environments. Attending to the infra-structural dimension of these milieus disclosed their processual character, which could be sensed bodily, as they made the effects on the visitor's bodies and feelings as well as the environment perceivable. Elements in the environment such as air, light, and sensing technologies mediated and expressed different temporalities of actions in the space. They connected the subject with its surroundings beyond the present or subject-related perception of time, and brought processes and interdependencies to the foreground that

had happened in the past, but that also mattered in the future. The aesthetic milieu therefore potentially fulfilled the function that a stigmergic environment plays as a mediator in symbiotic relationships. It is a way of communicating with others across temporal and spatial dimensions.

Exploring possible new perspectives on the human-environment relations that are enabled through an attunement towards metabolic processes in art projects has allowed me to articulate the different phases from which these relations are dynamically composed. These phases can become explicit in the form of aesthetic experience, and in giving meaning to a larger context of experience, from which the experiencing subject emerges as a point of view. With Whitehead's notion of prehension and Despret's concept of care as a "anthropo-zoo-genetic practice," I have proposed that a metabolic aesthetic can enable an intersubjective attunement towards non-human others through the expression of meaningful patterns that can be used as a foundation on which to project a shared future reality.

In the view outlined so far, the metabolic subject is sensitive towards processes before they become represented in the conscious mind. Aesthetic milieus that mediate such processes do not offer concrete actions in space; rather, they allow for the intensified experience of being in metabolically structured relations to space before any conscious action or reflection follows. This experience does not target a subjectivity different from the conscious subject—the metabolic subjectivity is to be understood instead as emerging from a phase of the ongoing process of interrelating between body and surroundings. So far, I have described an aesthetics of metabolism as concerned with processes internal and external to an experiencing subject and as intensifying aspects of interrelations with our surroundings that, in being expressed, can become part of our conscious reference to the world. In the following chapter, this process of creating new meaningful relations based on atmospheric and metabolic processes will be explored further.

Atmospheres of Dwelling

Over the course of my study, I have explored different areas in which the metabolic interrelatedness of humans and their environment could become sensual. First, I showed how the interoceptive sense allows us to attune to the bio-chemical dimension of our body and how feelings, possibilities for acting, and also a sense of self emerges from there. Then I looked at the ways environments externalize metabolic interrelations between organisms, how the being-in an environment leaves traces that bare meaning for those who become attuned to them. I have proposed speculatively that an aesthetic experience in which meaning is assigned to these newly perceived metabolic correspondences comes with an acknowledgment of something shared that lies outside the conscious grasp of the human subject.

In the previous chapters, I described aesthetic experience of metabolic correspondences by expanding Seel's definition of aesthetic perception towards the sensing of metabolic interrelations, which concerns processes internal to our bodies and between our bodies and the environment that can only become sensuously perceivable in their effects. Using Dewey's notion of aesthetic experience, I highlighted the operative dimension of the experience of our bio-chemical dimension, which consists of continuously re-establishing a meaningful relationship through engagement with our environment. Meaning is thereby understood as a relation (Langer 1951, 44) and not something reserved for "higher" cognitive capacities. Becoming sensitive to the meaningful relationships that are established, lost, and re-established in the bio-chemical dimension of our being means to acknowledge our ability to be affected and to affect metabolically, and, to say it with Despret, to acknowledge what our bodies and bodies of others *make*. An aesthetics of metabolism gives the potential to sensuously perceive these correlations in

different layers of engagement with environments, internal as well as external to our bodies, whereby these layers in my examples intermingle.

The capability to be affected by the environment is not only particular to humans but also includes other living and nonliving entities. Because this affectability of, for example, vegetal life or minerals usually happens on a scale outside of human perception, the affectability of nonhuman entities needs to be mediated so that a human can intersubjectively attune to those others. In my previous examples, this attunement became possible because of the sharing of metabolic pathways, which allows processes of one's own body to be brought into relation with processes of other forms of life. I have argued that it is through this attunement towards our biochemical dimension that the subject becomes open to their own processuality, to the way feelings, thoughts and actions are affected by continuous intake and conversion of matter into energy, as well by their extraction of wastes. Now I will investigate how it is that these experiences not only are meaningful on a pre-reflective, embodied level, but become subject to conscious thought as well. How does the body, or more precisely, the feelings and sensations that come with metabolic processes, become a signal that can be contextualized, be reflected upon, and enrich further the engagement with the surrounding world?

In order to describe how abstract thought and new intentional action develop from the aesthetic experience of metabolic processes, I will consider characteristics of the aesthetic mode of perception that I have identified so far in relation to theories, which place consciousness as evolving from pre-reflective experience. One of these theories is that of prehension by Whitehead. I will put forward the idea that attunement emerges from prehension in enabling the experience of a relation, which might include sense perception, feelings, or moods. Attunement then allows us to form some kind of knowledge that re-contextualizes not only what the subject-in-attunement attends to, but the formation of the subject itself.

What I call knowledge here is not equal to abstract knowledge of something in its being-so. Not falling for the "God's eye view" (Haraway 1988, 589) that Haraway identified as fostering binaries and thereby producing harmful inequalities, my exploration of the passage from intuitive, bodily knowledge of attunement to abstract thought is meant to add to the practices of situated knowledges. Situated knowledge pervades the epistemological, ontological, ethical, and political planes and thus excludes the ideology of expertism. In resonance with this account, I will describe the process from bodily engagement with the world to abstract thinking by further expanding my own phenomenological observations with concepts from philosophy and media theory, which, in part, were presented earlier in this research. Newly introduced will be the term *mimesis*. Mimesis, generally described as a tendency to synchronize the affective expressions, vocalizations, postures,

and movements of another person (Chartrand and Bargh 1999), will play a role here in its relevance for an expansion of the dynamic of intersubjective awareness towards non-human matters.

The suggestiveness of the concept of the metabolic for a thinking-with philosophies of process, embodiment, and aesthetic theory brings into focus the unfolding relationships not only between bodies or matters and their environments but between ways of creating knowledge as well. The process of mimetic synchronization between bodies is therefore explored here as part of the phase of meaning-making, a form of corporeal imagination that allows one to gather percepts from different senses and to transfer them into abstract thought. It follows that I understand affect, attunement, and mimesis as processes that not only relate different entities but that also modify them at the same time. My thinking proceeds here from understandings of the relation of affect and mimetic faculty that follow William James, a philosopher of the late 19th and early 20th centuries whose work greatly influenced both phenomenology and pragmatism. James saw affect as embodied and yet related to cognition (1884). In James's view, affect followed perception but led only at a later stage to an emotion that could be recognized by a consciousness. This understanding of affect and attunement differs in focus from more recent research in psychology, such as that of Daniel Stern. Stern researched affect attunement based on mimetic behavior as it develops between a child and their caretaker (1987). The difference between Stern's and James's approach, and mine, for that matter, is that Stern only regarded one phase of attunement between a subject and an other. From my perspective, this phase emerges only at a later stage in the process of relating, in which an interaction between child and caretaker leads to a shared understanding of reality through new forms of nonverbal engagement and a shared emotional stage. A processual perspective, which I want to bring forward here, considers the phases before this materialization of emotional subjects, without disregarding conscious reflection.

The questions that remain in my study are, for one, how is it that we create new meaning by attuning to an other that may not even be human? And, following from that, how can we create an emotional relationship and consciously reflect on what follows an attunement to shared metabolic pathways? The following chapter will provide perspectives on these questions rather than answers. In the sense of a situated knowledge practice, I will further expand my analytical-speculative perspective, and include my own experience—both in the form of first-person experience of a processual aesthetic and from the perspective of being a creator of and observer in an aesthetic environment. My perspective in what follows is thus multiple from the start; it is a multiplicity that is productive for a speculative thinking-with others—with concepts, atmospheres, subjects, and organic and inorganic matters. My starting point

will be an encounter with scholars, designers, and artists, brought together by a shared fascination for the materiality of atmospheres.

Affective Atmospheres: An Experimental Practice

In 2018, I travelled to Arizona in the US in order to incorporate my, until then, theoretical research on atmospheres and aesthetic experience into the design of an experiential space. Based on a shared interest in atmospheres as processual media, a project team was formed that essentially consisted of artist Nima Navab (*Topological Media Lab, Concordia University*), Sha Xin Wei (*Arizona State University*), Michael Monterano (*Concordia University*), Thierry Dumont (*Topological Media Lab*), Emiddio Vasquez (*Arizona State University*), and me. The first workshop in Arizona was followed by a second workshop in Montreal, Canada, in 2019.

Over the course of one year, we had many discussions about respective research interests, read and debated theoretical texts together, and also constructed two prototypes for installations. Both prototypes consisted of an aquarium with atomizers that turned water into gas and finally clouds. The working title of the prototypes is *Affective Atmospheres*, which is how I will refer to them in the following. We invited people to visit the space and engage with the prototypes, but we also engaged with the prototypes ourselves to test assumptions and to gain greater understanding of the scopes of sensual experience and interaction alike, as enabled by the two prototypes. Thereby, we were continuously refining our respective research questions.

The aesthetic milieu *Affective Atmospheres* allowed me to engage with the elemental medium water, and gave me an embodied understanding of how the physical processes that lead to the emergence of a cloud could be mediated to give an aesthetic experience of processes. These processes encompassed not only the physical processes of the material, how water would turn to bubbles, mist, and clouds, but also atmospheric processes that would impact these phase-changes, such as air flow inside the space. The sensual, multi-modal experiences of these interrelations were then contextualized in the theory of an aesthetics of metabolism, as I have developed it here.

Metabolic processes, in this context, do not designate bio-chemical processes of extraction and transfer of energy as internal to or between bodies, but rather as the flow and containment of energy between living and nonliving bodies in a shared milieu and the sensuously perceivable effects that emerge thereby. The metabolic perspective that arises from an attunement towards these processes is able to acknowledge the momentariness of all perceivable forms and how the in-betweenness of these formations, the phase-changes in

the medium, are traces of those meaningful relations that can be pre-reflectively sensed.

My exploration of *Affective Atmospheres* focusses on two main characteristics of aesthetic experience and how they connect to the possibility of attunement towards metabolic processes. First, I will flesh out how, in *Affective Atmospheres*, climatic processes act on the movement and formations of the cloud in such a way that the environmental dependencies behind the sensuously perceivable formations can be recognized. In thus perceiving how air flow, temperature changes, and bodily movements make the cloud *act* in a certain way, I suggest that we are enabled to learn something about the sensitivity of our environments as well as our own bodies, and to reflect on our aesthetic experience.

Considering the ability of the clouds to be affected by their milieu allows me to further speculate about the potential of aesthetic milieus such as *Affective Atmospheres* to evoke novel relationships with our environments that account for this affectability. Does *Affective Atmospheres* allow us to gain greater sensitivity to the atmospheric involvements that embed us in the world? Could we learn from the clouds to act differently, to account for the effects our actions have on the atmosphere? I will tackle these questions again with Whitehead's notion of prehension and Despret's theory of attunement. Additionally, I will contrast the results of these observations with Simondon's philosophy of individuation and the operation of transduction. These three operations—prehension, attunement, and transduction—which I regard here not as separate but instead as different phases or focal points of processes of engaging within environments—allow me to focus on phases in experience that come before the formation of abstract thought but that are nonetheless not separated from it.

After securing the proposition that the aesthetic milieus offer ways to sensuously experience the sharing of a capability to be affected by climatic conditions with living and non-living bodies, I will turn towards forms of engagement that might follow from these experiences. I will suggest that, in prehending the ways the cloud is being affected by environmental impacts, the cloud becomes part of one's own reference to the shared milieu. In this way, the affectability of the clouds becomes a signal that can be incorporated by the subject into its own bodily engagement with the environment. The processes that lead to different cloud formations are thereby embodied by the experiencing subject and expressed in new ways in which the subject acts in the environment. The embodiment of this signal is identified here with mimetic behavior: Learning from the affective relation of the cloud and its climatic surrounding, we start to enact the effects of these relations with our own bodies.

Ultimately, the consideration of becoming-familiar with new dimensions of experience expands my exploration of a metabolic perspective towards educational theories as well. If meaningful relations start to matter before we can relate them to our ego-perspective, well-being, and intentional purpose, would we change the way we act in the world in the long-term? Can we *learn* to consider processes and entities that seem to not stand in immediate relation to our own wellbeing, but that we share metabolic bonds with? In order to understand how the processuality of an atmospheric medium might be vital to addressing those questions, it is helpful to contextualize it historically and with regard of the properties of its materiality. What follows is a brief overview of the aesthetic theory of clouds that informed, in part, the collaborative work on the design of *Affective Atmospheres* and, therefore, provide the background to my subsequent exploration.

Clouds as Media

So far, the main medium of interest in this study has been air. Clouds, too, can be categorized as environmental media, or sky media, as Peters calls them (2015, 165). Clouds are not solid objects; they are processual in nature and usually seen from a distance. The aesthetic experience of clouds when viewed from afar is different than when experienced in close contact. A sky can be calm, with clouds, if present at all, moving slowly. They can appear like distinct flakes or large chunks. They can move quickly and at different heights, appear colorful or gray. They seem to be contained in a form even though they are constantly forming—clouds recompose all the time.

Clouds bare meaning for farmers, pilots, and sailors. They are both technical objects and natural phenomena. As Peters points out, when considering the mushroom cloud, they are the “most important facts and symbols of the postwar era” (2015, 165). The metaphor of the cloud, he continues, became popular in the business of information technologies as well. He quotes the “Google insiders” Eric Schmidt and Jonathan Rosenberg: “It’s called ‘cloud computing’ because the old programs to draw network schematics surrounded the icons for servers with a circle. A cluster of servers in a network program had several overlapping circles, which resembled a cloud” (Peters 2015, 332). Clouds, in this context, suggest containment and connectivity, while at the same time remaining permeable. They can expand or shrink, depending on the schematic framework.

Before their appropriation by the business of information technologies, clouds have long been vital metaphors in the arts of literature, poetry, and painting. Clouds turn the sky into a landscape itself, make its seemingly vast emptiness relatable. In thus designating an invisible border, a zone that divides livable and unlivable space, clouds impact our moods in a particular way.

Furthermore, the way they change is often associated with changes of our inner lives or social change, as Mary Jakobus argues:

Mood is like the weather, changing and unformed, yet always with us. In classical landscape painting, weather and mood converge on the drama of the sky. A cerulean sky spells calm; dark clouds indicate tempestuous events or passions. But in temperate climates, we most often experience an in-between state that is subject to subtle fluctuations of brightness and shadow, transparency and opacity. (2006, 220)

The cloud as the surfaceless body (Jakobus 2006, 220) in the early 19th century served as the motif for obscurity, change, and the ephemeral. "Seeing things through clouds" reflected a different relation to reality (Jakobus 2006, 187).

Psychologist James Gibson, in his understanding of media, referred to clouds in a different way—not as surfaceless, but exactly as an example of the function of surface in perception. Gibson, who was one of the key figures in research on visual perception in the mid-20th century, continued to define the environment as a medium that consists of different substances and their surfaces. Clouds were understood by him as a certain kind of surface that reflected light and enabled perception. While he characterized surfaces as interfaces between substances and medium, he designated substances as more or less solid; they could be perceived, whereas a medium could not. Ambient light would be a medium in Gibson's sense: It can only be perceived if reflected by a surface. He went on to exemplify his theory of perception, to explain how ecological events could be perceived, and, finally, how they could lead to perceived possibilities of action, what he called *affordances* ([1979] 2015, 102). Affordances, more generally, are defined by Gibson as opportunities given to organisms by the environment, which functions thereby as a medium. He states that "...the characteristics of an environmental medium are that it affords respiration or breathing; it permits locomotion; it can be filled with illumination so as to permit vision; it allows detection of vibrations and detection of diffusing emanations; it is homogeneous; and finally, it has an absolute axis of reference, up and down" (Gibson [1979] 2015, 18). Substances, on the other hand, can change. The substance of the cloud would be the mixture of water droplets and ice particles that, within a certain range, creates a surface that becomes perceivable as a cloud. If the composition of the particles that form a cloud changes or even dissolves into a purely gaseous state, the substance loses its surface and becomes thereby a component of the medium (Gibson [1979] 2015, 99).

This characteristic of clouds as moving between the visible and the invisible, between medium and substance, is increasingly noticeable in art today. Many contemporary artists create clouds artificially, moving between their metaphorical meaning and actual presence. Installations such as *Cloud Square*,

by Karolina Halatek, play with the distance that is usually between us and clouds, offering a “sky experience,” as the artist promises on her website. Other works, like the indoor clouds by Berndnaut Smilde, could be seen rather as cloud sculptures: perfect fluffy clouds hanging in midair inside a room for a short moment, to just dissipate again in an instant.

If, as Seel remarks, everything can become an aesthetic object in perception, if it is taken as occasion or opportunity to perceive sensuously in a particular way (2005, 21), then clouds give way to particular sense perception though their ephemerality: They change shape, take on form and dissolve again in barely visible layers. This particular way of perceiving can be further described as decentralized. The way we observe clouds from a distance is always supplemented depending on our immediate surroundings, the ambient light, and how much of the sky is visible to us. Even if we do not observe the clouds intently, they can be present in the periphery of our perception, as they determine how much sunlight is reflected and illuminates our surroundings. Taking together the perceptual affordances of clouds—their lack of boundaries, their ephemerality, their processuality—the subjective perspective they suggest is dissipated, peripheral, distracted, and supplemented.

Taking these associations of clouds, along with their connection to the affective, emotional register and to the notion of representation, as well as their material presence and relation to climate as a starting point, the team and I constructed the aesthetic milieu of *Affective Atmospheres*. We focused on the materiality of clouds as it comes to the foreground as emerging from climatic conditions—not as something abstract or distinct, but processual. We wanted to create a milieu that would evolve with the engagement of people, considering human bodies as one element amongst others, and exploring together conditions for clouds and creating new ones. In this sense, *Affective Atmospheres* followed Sha’s understanding of responsive media environments: “A responsive media environment is a physical space in which people’s activity and time-based media (video, sound, active materials) influence each other and evolve in concert to create an event” (2013, 54). Here, the temporal scales in which clouds form from water molecules were brought into relation with the subjective time of lived experience.

The Experimental Setup

The first prototype of *Affective Atmospheres*, depicted in figure twelve, was hosted by the Synthesis Center at the Arizona State University 2018. The design team built an aquarium that was about three square meters (32 square feet) in size and reached the chest height of an average person.



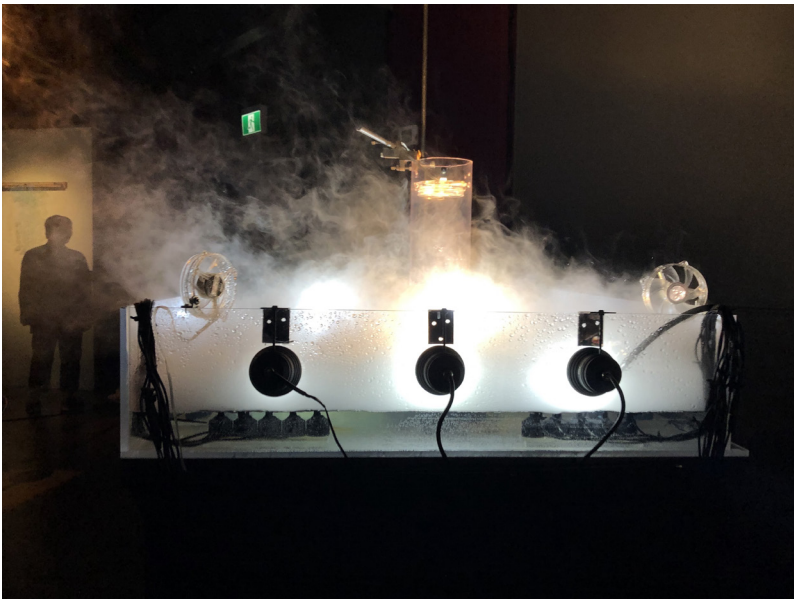
[Figure 12] Affective Atmospheres prototype No. 1, 2018 (source: Nima Navab)

At its base, we placed 30 ultrasonic atomizers, which converted high-frequency sound waves into energy. Submersed in water, the vibration of energy waves broke the unified state of the waterbed, which led to either the formation of bubbles on top of the water's surface or the transformation of water into fog or small clouds, depending on the pace of the vibration. The various formations of mist and clouds of different textures could be visually observed throughout the space. In this way, we were witnessing the emergence of events, if we understand this emergence as stemming from a "representational relation to their content" (Sha 2013, xvi). Thus, these events partly symbolized something familiar, re-enacting phenomena we might know from a different context. To explore this, we equipped the apparatus with further tools that would provoke phase-changes in the elemental media. In the first prototype, a multi-directional light embedded inside the aquarium could project the different patterns that came with the phase-changes onto a white screen that was mounted on the rear part of the aquarium. This two-dimensional projection captured and augmented the material processes so that an almost pictorial, cinematic scenery was created, which, at times, reminded us of a sunset over the sea.

In *Affective Atmospheres* in particular, these familiar events were waves, clouds, and mist, but the conditions of the emergence of these perceivable phenomena were revealed as well. As the elemental media of these events—water, light, air—were processual and would display the process leading to the creation of the event, our own meaning-making process in perception started to matter. This process of phase-shifts within the medium can be seen as analogous to the unfolding of lived experience. What would it take to

recognize a scene as a familiar event? To relate the sensual correspondences inside the conditioned milieu to our own life and the processuality of experience itself, to what we know and remember as a shared everyday-world?

With the first prototype, we wanted to create particular sceneries, like those described above, for visual observation. Therefore, we positioned the atomizers in such a way that we could control very precisely how the water would vibrate and could choreograph how it turned into waves and bubbles, and how water particles would turn into mist, and finally clouds. With the second prototype, we took a different angle. It was built during a workshop hosted by the Topological Media Lab at Concordia University in 2019. This time, the aquarium was slightly larger, which allowed us to create even denser cloud structures, as more water could be vaporized, as can be seen in figure thirteen.

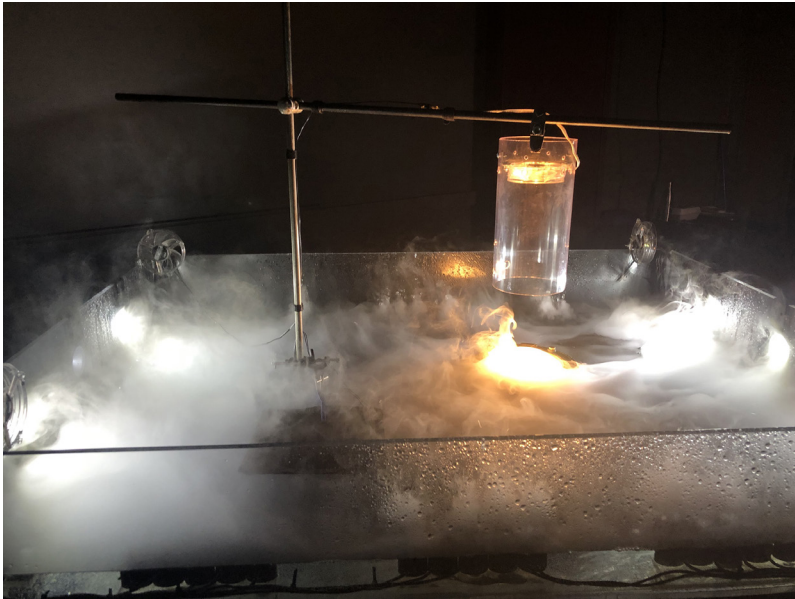


[Figure 13] Affective Atmospheres prototype No. 2, 2018 (source: Nima Navab)

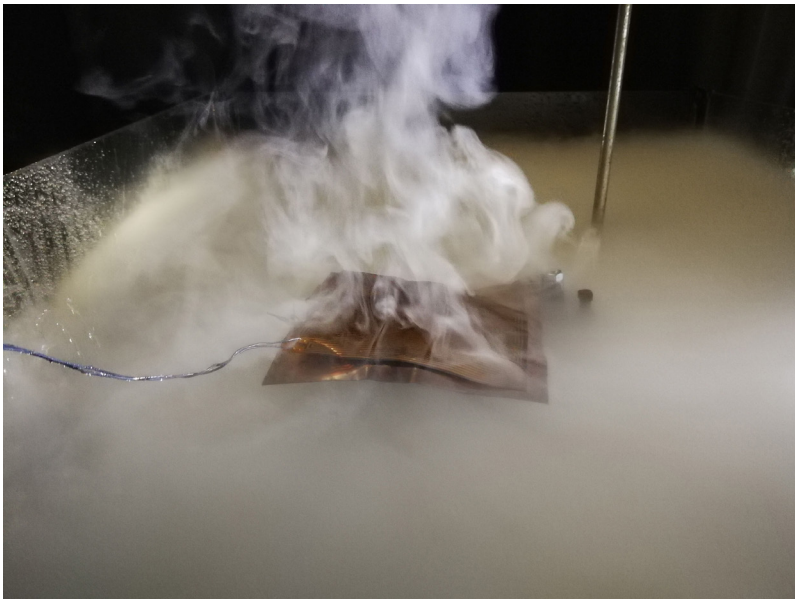
Our goal was to make the aesthetic situation sensually more immersive and to allow for more differentiated and simultaneously present phase-changes in the material. This way, the cloud could be perceived in the sense of Gibson as a surface that reflects ambient light, as it dissolves into the medium of the atmosphere, and as processes of composition and dissolution that happen between these two events.

Besides the light, which, this time, came from the sides without any particular function except to illuminate the scenery, we installed further tools to impact air flow and localized temperature in the apparatus. We attached four fans to

the corners of the aquarium and placed one cylindrical fan (figure 14) over the surface of the water in the middle of the aquarium.



[Figure 14] Affective Atmospheres prototype No. 2, detail: fan. 2018 (source: Nima Navab)



[Figure 15] Affective Atmospheres prototype No. 2, detail: heating plate. 2018 (source: Nima Navab)

We mounted a heating plate (figure 15) on one side so that its heating surface was a few centimeters above the water, and we equipped the base of the pool with heating lamps. The fans at the corners could turn the cloud into a vortex, the fan in the middle of the water would either “shoot” the mist upwards, like a cloud of smoke from a factory, or, if turned upside down, create clouds rolling over the water like waves. The heat coming from the lamps on the bottom made the clouds dissipate faster, spreading and rising above the pool. The heating plate on top of the pool heated up the air under and around the plate and “pushed” the mist upwards, condensing it to vapor. When the vapor moved around the plate and above it, the heat “pressed” it further upwards, where it started to become more dispersed again, looking like smoke rather than vapor. Condensing in the hot air flow, some particles turned into liquid water again and dropped down onto the plate, creating a hissing sound when they vaporized on contact.

Embodiment of Processes in Aesthetic Milieus

How does it feel to look at cloud formations from afar, and to then focus on different phase-changes in the material that lead towards the formation of a cloud? How does it feel to be immersed in the mist, to sense the impacts of temperature change or air flow on the clouds and create such impacts with our own bodies?

Affective Atmospheres presented a milieu in which atmospheric processes expressed a sense of their own becoming and, at the same time, their openness to be affected. My study in this chapter considers four particular engagements with the clouds in the aesthetic milieu that I observed during the two workshops. The fact that I simultaneously took on the roles of both observer and participant in the aesthetic milieu is reflected in the following by making the respective roles in the described engagements explicit.

Engagement #1: Sensing Pressure

The fans that were placed in the corners of the aquarium were able to produce a vortex when they were turned on simultaneously. When we held our hands inside the vortex, we felt the air flow and humid air on our skin. The air flow was strong, and the fans gave off a metallic sound when they rotated. What we noticed was the difference in thresholds between the feeling of consciously being affected by the air flow and the affective response to it observable in the cloud movements. When, for example, we changed the direction of the fans, we could see the cloud respond to the change in air flow much faster than we became aware of it sensually through our own skin. This engagement, therefore, tells us, on the one hand, something about the different ways and temporal scales in which phenomena express how they are affected. On the

other hand, it became apparent how an involvement of different sensual modes leads to a decentralization of visual perception.

Engagement #2: Effects of Gestures and Collective Movement

One day, a group of five people came to see the prototype and observed with particular interest the movement of the air flow that made the vapor expand beyond the boundaries of the pool or upwards. In this scenario, the atomizers were working all at once, thus producing a lot of mist. No additional air flow was generated by the fans, but there was a “natural” air flow inside the space, due to air conditioning, opening and closing of doors, and bodies moving.

The group tried to find a collection of movements that would influence the flow of the vapor as a whole in similar ways as the fans did. During this operation, they realized a difference in gesture and needed effort between the attempt to move the mist away from the group and to move it towards themselves, and they also realized a difference between the attempt to make the mist overflow the boundary of the aquarium downwards and to make it rise upwards. During these attempts, the participants were in continuous dialogue about what they were experiencing, exchanging ideas of what to try next. In exploring the behavior of the vapor in the space in relation to pressure applied by their hand movements, the elemental dependencies of the clouds could come to the fore. The fact that it takes less effort to move air away than to move it towards oneself has an intuitive logic to it, just as moving the fog horizontally over the pool is easier than moving it upwards. But here, the physical dependencies of material behavior could be physically felt and explored with spontaneous gestures and body movements.

The group observed these dependencies for a while and then developed a range of new movements and gestures. These collectively developed gestures intensified the impact of pressure on the vapor, highlighting the possible effects of human behavior on the participants’ immediate atmospheric environment. During this process, they not only copied movements from each other, but also derived possible motions from the observation of the effect the invisible air draft had on the material.

Engagement #3: Thermo-Sensing: The Processuality of Experience

The heating plate is at the center of the last two engagements I want to focus on. When I first saw the heating plate pushing the mist upwards, I felt the impulse to reach out my hand and to place it over the heating plate (figure 16). Others seemed to share this impulse. We all stretched out our hands at some point and held it in the vapor above the heating plate. And we all shared a moment of surprise. The air was not hot; in fact, it was not even

warm. The humidity of the vapor gave us a relatively cold sense of the temperature, which only after a while led to the detection of heat through the thermoreceptors in our skin. By then, my own hand had become cold in the cool, humid air. Again, I learned something about how our bodies are affected by conditions that have a different effect on phenomena, which I can perceive in front of me. What we see seems to make us form propositions about how something *is*, how something *feels*.



[Figure 16] Affective Atmospheres prototype No. 2, detail: heating plate, hand, 2018 (source: Nima Navab)

Engagement #4: Mimesis: Learning from Affects

While I was thinking about this, something else happened, which leads me to the fourth engagement I will focus on throughout this chapter. Some people started to develop gestures and hand movements in the vapor next to the heating plate. I began to understand these gestures as attempts to make the vapor move just the way the heat from the plate did. By guiding their hands through the clouds in a rotating and rapid manner, the participants tried to evoke smoke-like structures. Moving their hands or fingers through the vapor in these ways, they seemed to search for the right pressure and angle to repeat an effect they had witnessed in the clouds due to heat. Sometimes they corrected their movement if a first try did not have the expected effect, and sometimes they discovered effects of their movement in the clouds that did not resemble the desired outcome but that seemed to excite them enough to make them keep on exploring the movements.

The Aesthetic Experience of Clouds

The engagements with the two prototypes of *Affective Atmospheres* that I described above highlight some characteristics of an aesthetics of metabolism that I will address in the following sections. They will help to address the questions of how it is that we can shift into a process-oriented mode of perception, to what extent the processuality of the experience itself can be experienced, and how we can assess that this experience generates a new relationship with the environment.

In a first step, the engagements show how aesthetic perception makes us shift our awareness from a fixed object to processes, and from visual observation to synaesthetic perception. In the example (Engagement #2) in which I held my hand above the heating plate, I could not feel the heat but could observe, at the same time, how the vapor responded to the warmer temperature. I thereby shifted my attention on the vapor as *being-so* towards it being a phenomenon emerging from a context: a context I could experience myself in holding my hand above the plate, and that came to my attention exactly because my observation of the vapor made me expect the air to feel different from the way it actually felt. These sensual experiences involved different senses: the feeling of the humidity on the skin, which gave a sense of cold rather than heat; the sound of the water droplets that evaporated when they touched the heating plate; how, after a while, the temperature of the hand would cool down, nearing the temperature of the vapor around it; and how, in this cooled-down state, a sense of warmth seemed to emanate from the heating plate, although still indistinct and still more like a trace in the vapor than an explicit sense of warmth. The play of the appearances (Seel 2005, 88) of the vapor in perception could come to the foreground of my aesthetic awareness as processual and permeable. The opening up to the situation in synaesthetic experience segmented the cloud from a distinct object into micro-processes of formation. Besides this involvement of different senses that made me attentive to the unfolding of the phenomenon of the vapor and how it continuously changed, I noticed how my own experience changed, as it were – the latter both through my physical sensitivity, which evolved through the different temperatures in the cold fog, and depending on where I directed my attention.

As mentioned earlier, the context from which the perceivable formations in the vapor emerged—the different intensities of temperature and the air’s humidity—stood out even more due to the unexpected contrast of the sensual experience of the temperature above the plate and my expectation drawn from my previous observation of the vapor. The moment of surprise about the felt temperature above the plate suggested that there was more to the observable phenomenon than it revealed at first glance. The felt surprise thus

made me reflect on the affectivity of the climatic conditions in the aesthetic milieu and how they register in the cloud formations in ways that are different than my own sensual capacity was able to detect.

While sharing a bigger environment, we did not share the same surroundings with the vapor. To briefly reiterate the difference between environment and surroundings according to Uexküll, surroundings (*Umwelt*) are what the organism can sense—it is thus mediated and thereby transformed by its sensual apparatus—whereas the greater environment (*Umgebung*) of an organism is that part of the surroundings in which the organism is placed. Merleau-Ponty refers to Uexküll's concept of *Umwelt* in his later work and points out its intermediary character: "The *Umwelt* marks the difference between the world such as it exists in itself, and the world as the world of a living being. It is an intermediary reality between the world such as it exists for an absolute observer and a purely subjective domain" (2003, 167). An environment understood as *Umgebung* can contain different organisms that experience different surroundings within it. The environment we shared with the clouds was the space and the atmosphere of the space, which acted upon the cloud movements and that could be sensed by our sense apparatus. But the comparison between our own sensual experiences and the perceivable movement of the clouds signaled something about the environment that was shared—a shared dimension, an intermediary contact zone of the multiple individual surroundings, which we could assign meaning to.

This first exemplary engagement brings into view the three aspects of aesthetic perception I will focus on more deeply—namely, the involvement of different senses, the processuality that involves the perceiver and the perceived, and the sense of potentiality as it emerges from there—and especially their role as part of an aesthetics of metabolism, which will be studied in the following sections.

Clouds and their Associated Milieu

Aesthetic perception makes us shift our attention from a perceivable event towards the conditions of the event. These conditions, as it turns out in our explorations, are not only the elements of the technical apparatus, such as the fans that blow air and the plate that emanates heat, but also the molecules the vapor is composed of, the atmosphere inside the space in which the prototype was placed, human bodies, and so on. What comes into view is under which circumstances continuous processes within a milieu may form perceivable events and how these processes can lead to unforeseen cross-effects that, as a consequence, emphasize the inherent activity together with the relationality of the elements. In the following, I will explore this process with Simondon's notions of "individuation" and "transduction." This will allow me to further

describe how we come to conceive of interrelations with and through a non-living material such as clouds.

For Simondon, individual entities, which we refer to in everyday life as the enduring objects we are surrounded by, are, in fact, perceivable only because they are momentarily stable. This momentary stability should not be mistaken for expressions of an inherent substance. The individual, instead, must be thought of as an establishment of momentary relations between the potential energy (Simondon 1992, 300) in the pre-individual and the resolution of tension, which happens in different phases, or rather, through a continuous de-phasing (original: *déphasage*) as a reoccurring destabilization (Beistegui 2012, 172). Simondon thought of the process of individuation as inherently dynamic, without any original state or endpoint to which the transduction would proceed. Each phase of individuation must be understood as momentarily stable, as a stability that is lost if the energy in the pre-individual reaches a point of oversaturation. *De-phasing* thus designates a falling-out-of-phase, with an emphasis on the de-stabilization that forgoes re-stabilization, rather than a *phase-shift*, as a shift from one phase or state to another. Individuation, for Simondon, designates a productive process from which the individual is composed. Furthermore, the individual always individuates in relation to its milieu, which emerges as an unactualized potentiality. Simondon understood individuation as happening throughout the regimes of the physical, vital, psychic, and collective but granting each a different operational character.

Transduction is one of those operations that can be found at all levels of being. The term comes from the Latin *transducere*, which means “to change over, convert.” Since the 17th century, it has been used in different contexts to describe the transformation of something from one form into another. Simondon designated transduction as initiating a process by which energy is actualized that can lead to forms that can be perceived by a subject. As such, transduction actualizes potential: “Previously to perception, to the genesis of form that constitutes perception, the relation of incompatibility between the subject and the milieu exists just as potential ... Perception is not the seizure of a form, but the solution of a conflict, the discovery of compatibility, the invention of a form.” (Simondon 1989a, 76 [translated from French original])

This conflict Simondon speaks of emerges between the pre-individual energy and the individual in its becoming. The pre-individual realm provides at once potential and the limitations of the individual’s becoming and can thus be further understood as an ongoing process of overcoming the constant tension between pre-individual and individual. Simondon’s philosophy places an emphasis on the processuality of experience, designating perception as only one and a later phase of this process. It is important to note here that perception is understood by Simondon as a structuring of the relation

between an entity and its world. With this in mind, if we return to the engagements with *Affective Atmospheres*, we can single out those instances of the de-phasing that constitute perceivable events and that afforded new ways of engaging with the atmospheric medium.

First, we ought to notice that, when we, in our research group, observed the different formations in the clouds, we were not able to perceive this de-phasing of form as such. What created the perceivable event was the momentary establishment of perceivable forms and the creation of new forms, which appeared as a shift from one state to another, in particularly when it involved a change in aggregate state: When the water droplets merged with the surrounding air to form vapor and clouds, the ongoing individuation of clouds became perceivable in the form of different states of the material, which expressed a momentary relation between water and apparatus. The variations in form and movement were obvious; they expressed the emergent qualities of one process: atmospheric convection. If we look at this process with Simondon's terminology in mind, we can understand water and atmosphere as the associated milieu of the clouds. The associated milieu forgoes any individual entity; it is the potential energy that lies both within the individual and external to it. The individual-milieu dyad is at the center of Simondon's philosophy and must be understood as emerging from an ongoing resolution of potential between these two orders of magnitude. This creates an initial relationality where matter and form only sit at the very extreme.

The notion of the associated milieu is crucial for my venture to identify the moments of de-phasing in the aesthetic milieu of *Affective Atmospheres* that lead to perceivable events. I will therefore spend some more time explicating Simondon's concept before returning to the piece. Simondon demonstrates his concept in the example of photosynthesis. A plant, while performing photosynthesis, brings into relation different orders of magnitude: the cosmic order of sunlight and the order of the soil (Simondon 1992, 318). The plant, in bringing into relation these different orders, emerges from that relation itself as an individual. The plant, so to say, *is in* the process of photosynthesis. Thereby, as philosopher Muriel Combes explains, the plant, while thriving, gives rise to its milieu at the same time:

A plant ... establishes communication between a cosmic order (that to which the energy of light belongs) and an inframolecular order (that of mineral salts, oxygen, etc.). But the individuation of a plant does not only give birth to the plant in question. In dephasing, being always simultaneously gives birth to an individual mediating two orders of magnitude and to a milieu at the same level of being (thus the milieu of the plant will be the earth on which it is located and the immediate environment with which it interacts). (2013, 4)

Being as the process of ongoing relating between different orders simultaneously gives rise to the individual and its associated milieu, in which the potential energy of the pre-individual is brought into relation to, in this example, its becoming-a-plant. In Simondon's plant example, it is the biological capacity of the plant-body to sense and direct itself towards the sunlight, to metabolize nutrition from the soil, and thereby establish a "communication," in Simondon's words, between these different orders of magnitude. The internal resonance between the nutrient saturation of the plant, its capacity for photosynthesis, the available energy in the form of sunlight, and the nutrient content of the earth—in short, the ongoing relations of the plant with its milieu—enable and limit the plant's individuation. Here, Simondon speaks about the individuation of a living organism.¹

To illustrate how the theory of transduction helps us to think about the aesthetic experience of a relation between the associated milieu of the cloud and our own associated milieu, I will return to the engagements with the heating plate. The heating plate, as part of the technical apparatus, conditioned the becoming of the cloud in smoke-like formations, how its form would change, and how we could sense these different formations. Simondon's theory allows me to understand this becoming of the cloud as more than just a form-giving process. It is instead a communicative process of sensing, structuring, and transforming of energy and matter, a process of becoming that interlinks and reciprocally shapes the cloud and its milieu, the atmosphere.

The associated milieu of the clouds can now be described in more detail. The water in the aquarium was transduced into vapor by the electrical waves of the atomizers. The air flow and temperature transduced the water molecules in the cloud structures, and provoked different formations or phase-changes. The water, air flow, and temperature, then, could be considered the associated milieu of the cloud—its environmental condition, which was reciprocally affected by the cloud as well, in changing the surrounding atmosphere. As such, the cloud becomes part of a bigger environment with its very own conditions of possible events, which we could sense and act upon.

The different modes of perceiving the cloud—as a familiar object or as processes of condensation, vaporization, and diffusion—stand forth as different ways to relate to environments, to contextualize our experience. In attuning to the interrelations and limitations between the associated milieu of the cloud and of our own, we take on a processual view. If our manner of perceiving transforms in order to regard a phenomenon in its processuality,

1 Simondon distinguished between the individuation of a living individual and the individualization of the technical individual, but both can be considered analogous in that the living and the technical individual and their respective associated milieus both develop from a pre-individual reality.

we might come to experience how climatic conditions affect our own sensuous perception and the cloud at the same time.

What does this observation tell us about the possibility that aesthetic experience could express a sense of its own processuality? What would that entail for the subject of experience? If an attunement towards the processuality of our own experience and of observable phenomena in our surroundings becomes the means of new forms of communicating and acting in these surroundings, new forms of subjectivation emerge that assign meaning to a relation without the need of a fixed object of that relation. I will deepen my analysis of this assumption in the next section.

From Affective Attunement to Subjectivation

Expanding the Context of Experience

The moment the fans produced a vortex in the clouds and then changed direction so that the graspable form of the vortex dissipated into haze (Engagement #1), brings to the foreground what usually lies in the background of our awareness: the context, the conditions of the perceivable event. These conditions—the directional airflow from the fans, the water, the surrounding temperature—are far from static. They unfold in time and have perceivable effects on our sense modalities, such as the haptic sense of air flow on our skin. As we move our attention to the context of the experience and become open to the play of forces within the elements, we move away from a distinct subject-object relationship. The focus on a perceivable, accountable object—the vortex—is replaced by a multisensory attention to the unfolding interrelationships between the atmospheric elements. In the following, I want to suggest that the felt difference between our own sensual experience of the climatic context, and what we perceived as the clouds' response to it, not only led to an acknowledgement of this difference, but also further allowed a form of communication with the clouds that took these differences into account. This acknowledgement of the affectability of bodies can thus lead to new forms of engagement.

In the previous chapter, I already introduced Despret's notion of attunement. Despret tells stories about human-animal relations and stories about stories. Her theoretical as well as methodological contribution to new humanist thought is, at the same time, poetic, speculative, and extremely smart. Thinking with Despret means thinking differently; it means to shift from situated human perspectives to the nonhuman, and to the affective relations between. In the following, I will briefly summarize her analysis of an historical example that she uses to explicate her theory. It will serve me to introduce a different perspective on possible ways to become familiar with the

different affectabilities of bodies and elements with which we share climatic surroundings.

Despret introduces the story of a horse called Hans. The story takes place in Berlin, 1904. A group of “gentlemen” got together one day to solve the mystery of the horse Hans that seemed to be able to solve multiplication problems. The group contained, amongst other professions, a zoologist, a vet, a psychologist, a teacher, and a circus director. The puzzle they were confronted with, namely, Hans, seemed to be able to solve mathematical tasks, discriminate between colors, and fulfil other requests, shown by tapping his right food on the floor (Despret 2004, 111). They wanted to verify if any tricks were used by the owners that would make Hans respond in a certain way. After several tests, the leading investigator concluded that no known tricks had been used by Hans’s owners to make the horse behave in a certain way. The conclusion was that Hans, in fact, did not solve the tasks on its own accord, but that “the horse must be reading cues. These are cues that humans cannot perceive and, moreover, the cues are given to him unintentionally!” (Despret 2004, 113).

Of course, the horse could not, in fact, count, or at least, he saw no reason to do so – but instead was influenced by the humans in a certain way so as to move his leg up and down a particular number of times. The interesting point for Despret, however, is not that the horse did not solve mathematical problems. What Despret points out is that the horse was able to be affected by the behavior of the people and, even more so, had an effect on their behavior in turn:

Indeed, the horse could not count, but he could do something more interesting: not only could he read bodies, but he could make human bodies be moved and be affected and move and affect other beings and perform things without their owners’ knowledge. And this could be experimentally studied. Hans could become a living apparatus ... Hans, in other words, could become a device that enabled humans to learn more about their bodies and their affects. Hans embodied the chance to explore other ways by which human and non-human bodies become more sensitive to each other. (2004, 113)

Apparently, there were no conscious tricks involved; instead, the cues that made Hans respond in a certain way had been given to him unintentionally by the body language of the person asking Hans the question. After many tests in which the person who gave Hans the mathematical task was not physically present or fully visible, it turned out that the key lay in the muscle tension of the questioner: His or her muscle tension apparently relaxed instantly when Hans performed the right number of hoof movements, which instantly resulted in Hans ending the counting and thus presenting the correct answer.

The explanation for the horse's uncommon behavior was therefore not a targeted training of the horse but the way bodies produce meaning through engaging with each other. As Despret follows from this, Hans "taught them how to be affected differently in order to affect differently" (2004, 116).

The example of Hans shows that, no matter whether we register it consciously or not, we continuously affect and are reciprocally affected; we create meaning in continuously interrelating with our environment and others we are sharing the environment with, and thereby expand the context of our experience. In the following, I will explore *Affective Atmospheres* as an apparatus, in Despret's sense, that allowed us to learn about the affects of climatic processes within a conditioned environment, how our bodies are affected by them, and how our bodies themselves become an affective force within the conditioned environment. In the aforementioned engagements, this learning was enabled through the recognition of a difference between the cloud's capabilities of being affected by environmental dependencies and our own.

The recognition of the high sensitivity of the vapor to pressure allowed us to further engage with the clouds in new ways: By applying pressure in different intensities, we could cluster vapor, form a larger cloud, or move a cloud across the waterbed. We explored new gestures, and the impact of angle and surface on the cloud, which expanded our motion repertoire and also changed the cloud formations (Engagement #2). If we understand attunement in this way as an active engagement that changes the subject-in-attunement as well as the one it attunes to, then a relationship of subject and environment is suggested that cannot be explained by theories that hold on to a dichotomy between subject and object.

The philosophies of Simondon and Despret determine two different perspectives on the unfolding relations within the aesthetic milieu of *Affective Atmospheres*, which are situated before any dichotomy between a subject and the objective world arises in cognition. Simondon in particular has allowed me, so far, to consider the relations between the clouds and their associated milieu as being established through processes of transduction, which could lead to immediate sensual experience. But as philosophy scholar Emeline Deroo points out, Simondon's philosophy does not explain further how the experience of such processes can become meaningful to a subject—not only in an operative, pre-reflective sense, but also in the form of symbolic meaning. Individuation is not the operation of a subject (2011, 302), that is, the individual in its becoming has no sense of its own becoming. Where Whitehead establishes the notion of a subjective form that directs the entity in its becoming, Simondon renounces any principle or teleological anticipation in individuation (Deroo 2011, 302). Although Simondon seemed to be less interested in processes of subjectivation and more interested in the operations that lead to

the composition of subjects, in his reflections on aesthetics, Simondon talks about the emergence of feelings that I see as similar to Whitehead's self-enjoyment or Dewey's aesthetic experience.

For Simondon, an aesthetic situation brings into resonance different orders of magnitude; it provides an encounter with the world that is, in itself, "beautiful" ([1989b] 2016, 191). He understood aesthetic feeling as exercising a specific mode of thinking by which a new reality emerges between the human and world, as a form of mediation between them. This new reality is one of felt unity, of completion, towards which aesthetic thought thrives (Simondon [1989b] 2016, 192); it is a form of unity that can be felt in the encounter with an artwork. As such, the "aesthetic reality" (Simondon [1989b] 2016, 194) is neither subject nor object; rather, it operates between "a real aspect of the world and a human gesture" (Simondon [1989b] 2016, 191). Even if individuation is not the operation of a subject, the feelings of "unity" enabled by an aesthetic situation seem to suggest an idea, an image of a balance between individual and world, towards which an individual individuates even if this balance can never be achieved.

As I do not want to compare the two philosophers at this point, but instead focus on the phases of experience and the possibility of becoming aware of a metabolic level within these phases, in the following, I will return to Whitehead's philosophy for pragmatic reasons. With Whitehead, it is possible to look more closely at the ways the processuality of pre-reflective experience might be integrated into the formation of a subject. This will allow me to argue that, for a conscious action that follows from an aesthetic experience, to integrate the processuality of that experience into the subject's own intent, a certain anticipation of potential becoming is needed. Ultimately, this proposition leads to the question of whether our subject-object relations could be expanded by engagements that acknowledge the potential of a becoming-with, if anticipations as they emerge before the fixation of this relation begin to matter.

Attuning to Different Thresholds of Affectability

At this point, Whitehead's philosophy of organisms can complement the analysis. The following section aims to explicate his understanding of subjectivity as evolving from a process that continuously integrates new feelings into the subject's own constitution. For Whitehead, which feelings become incorporated into the subject's composition in this way and which do not follows a certain order that is not strict. Thus, Whitehead's ontology is able to show us why certain contents in pre-reflective experience become conscious to a subject while others do not—or, on a different level, why certain encounters between an entity and its world affect that entity while others do

not. Thinking, with Whitehead's operation in mind, about the engagements with atmospheric processes in *Affective Atmospheres*, I will argue that not only new feelings were created but also new meaningful relationships.

But first we have to understand better how Whitehead places this operation in his broader ontology. Whitehead's concept of *concrecence*, describes the coming into being of actual entities, emphasizes the process of becoming as one in which the past of an entity is felt and integrated into its further becoming. Also designated as "production of novel togetherness," ([1929] 1985, 21) concrecence always has a subject. And it is due to the manner in which the subject produces the novel togetherness of past and present that concrecence is always unique. This novel togetherness thus composes out of past feelings that are integrated into the presence of the subject—what Whitehead called positive prehensions. But what is negatively prehended—those feelings that are excluded and do not become part of the novel togetherness—matter just as well. Both positive and negative prehensions form bonds between the actual entity and occasions for experience—in the following quote, defined as items in the universe. As Whitehead explicates:

There are two species of prehensions, the 'positive species' and the 'negative species.' An actual entity has a perfectly definite bond with each item in the universe. This determinate bond is its prehension of that item. A negative prehension is the definite exclusion of that item from positive contribution to the subject's own real internal constitution. This doctrine involves the position that a negative prehension expresses a bond. A positive prehension is the definite inclusion of that item into positive contribution to the subject's own real internal constitution. This positive inclusion is called its 'feeling' of that item. ([1929] 1985, 41)

If the internal constitution of the subject, in this way, depends on what is positively prehended just as much as what is negatively prehended, then how does that relate to the aesthetic experience of metabolic processes that I am out to describe here? Crucial in Whitehead's theory is that he describes a process by which relations are made or not—and this already on a level that forgoes perception. With this in mind, we can no longer describe perception as a simple selective process by which certain aspects in the environment are filtered. With Whitehead, we can say that those aspects that do not come to our conscious awareness, or do not seem to have any measurable effect on us whatsoever, matter just as much for our relationships with the world as those that we consciously relate to. An aesthetics of metabolism would then account for and express those negatively prehended aspects, and intensify them so that they can be perceived. To have an aesthetic experience of such processes, the processuality of experience itself has to be prehended positively.

To give a however limited example, let me return to my experience of hiking in Thailand. Here, on one level,² my “bond” with the actual entities in the “actual world” during the hike could be seen as partly constituted by the exclusion of certain items. Being too tired, I did not pay much attention to my surroundings at first. The positive prehension of the air in the air pocket not only changed my physical state but also allowed me to recognize the richness of oxygen in the air through the way my bodily constitution changed. I attended to aspects of my surroundings I had not paid attention to before. Because this change appeared suddenly, my feeling was intense enough to become explicit and meaningful.

Conscious experience, in that sense, could be understood as an event emerging from ongoing transmutation of experiences: “The feeler is the unity emergent from its own feelings; and feelings are the details of the process intermediary between this unity and its many data. The data are the potentials for feeling; that is to say, they are objects. The process is the elimination of indeterminateness of feeling from the unity of one subjective experience” (Whitehead [1929] 1985, 88). Indeed, my “aha!” experience was not just an instant in time. It began with a physical process, led to a greater awareness of the *here and now*, and then to the realization of how previous moments of the hike related to it.

In aesthetic experience, prehension could be seen as an operation that is part of attunement in this way, or leading up to attunement. Attunement, I suggest, would then be a form of engagement, which integrates the processuality, the witness of the prehending entity and the prehended one, that is particular to the pre-conscious stage. It seems that, in attunement, what is sensed is sensed without becoming a fixed object in perception. If we listen to music, *tune in* to a melody, we engage in a rhythm, let a certain mood “come over us,” let ourselves “fall into it.” This mode of listening to a melody, in attuning to it, is different from hearing a sound and identifying it with a cause: The sound of my alarm clock signals that it is time to wake up.

The thinking together of the different phases of Simondon’s individuation, Whitehead’s concrescence, and attunement as it has been contextualized here mainly with Heidegger and Despret, brings me to the following two potential consequences of a contextualization of *Affective Atmospheres* as an aesthetic milieu that enables the experience of processes: First, the clouds gain an experiential dimension themselves. Second, the attunement towards this experiential dimension creates a new potential for relationships and actions in and with the milieu. Thinking with Simondon allows us to see the clouds

2 Whitehead distinguishes between different phases of feelings. Prehensions that involve feelings are thus happening on different scales and within different complexities (Whitehead [1929] 1985, 164).

individuating within their associated milieu, in which the unfulfilled energy remains.

The first statement follows from the following considerations: Seen as a process of individuation, convection would add tension to the atmosphere by increasing the temperature and moving masses of air upwards, which impacts the behavior of molecules in the air. With Whitehead, we can add a subjective form to this process: the manner in which the molecules of the clouds, for example, prehend their milieu and emerge from the saturated air. The formation of the cloud then would emerge in overcoming this tension, transmuting the water molecules and hot air into a new unity. But it is necessary to add that this experiential dimension from Whitehead does not presuppose a subject. The subjective form of the experiential dimension forgoes any division of subject and object.

This leads to the second conclusion. If we assign the cloud an experiential dimension of its own individuation, we come to see our own experiences that followed from the engagements with it in a new light. What gains importance are less the particular effects a certain gesture might have had, and more the different thresholds of affectability: both in regard to the cloud formations and our own sensual experience. In impacting the cloud's movements by applying pressure with our bodies, by blowing into it, using fans and heating plates to change the motions of the molecules that the cloud was composed of, our bodies participated in transductive processes that happened on a nonhuman temporal and spatial scale. Becoming aware of the sensual experiences of our own bodies as they participated in these processes, we might come to attune to a dimension of what we could call a shared affectivity. From there, we might develop new means of communication with the cloud, that is to say, ways of engagement with the climatic conditions that impact their formations and our own sensual experience.

To conclude this section, let me sharpen my argument as follows. If we refrain from viewing Hans as being trained but consider instead the new gestures of Hans and of his people as emerging from a novel engagement between them outside a master-service-animal relationship, then this potency of pre-reflective engagement can be transferred into *Affective Atmospheres* as well. The gestures developed by us in engaging with the clouds were informed by the shared associated milieu of climatic conditions that we became able to reflect and act upon in an anticipatory manner. What comes into view here is the shift from aesthetic experience to abstract thought—from the affective, emotional register to that of symbolic reference.

For Whitehead, prehension happens before abstract thought can arise, but abstract thought is thereby inscribed with the feelings that emerge from perception in the mode of causal efficacy. Rationality then, as I have also

already pointed out with Langer, would have to be placed as inherent to those processes as well as forgoing conscious thought. Towards the end of this chapter, I will propose how these new engagements can be considered a way of learning about shared environments and thereby extend the sensitivity of one's own sensual apparatus towards metabolic processes internal and external to our bodies. Whitehead's notion of prehension can again support this point of view.

Mimetic Communication

This brings me to the second major topic of this chapter. In the following, I will look at the behavioral responses to the recognition of the effects environmental dependencies have on the formation of an atmospheric milieu in *Affective Atmospheres*. I will then further investigate the potential of acknowledgement of these effects, which come with the dependencies inherent to these responses. If we take seriously the assumption that an aesthetic experience of atmospheric processes goes beyond the conscious grasp of a human subject and involves the subject instead in a pre-reflective, bodily, synaesthetic manner with the environment, then the possible engagements that follow from this processuality have to carry these traces of the "pre-objective present," as Merleau-Ponty designated this realm of being ([1945] 2012, 457). In exploring the engagements, I will follow these traces.

If we can argue along with Whitehead that this pre-objective engagement is being inscribed into the subject as well, into its conscious and intentional reference to the world, how, then, would the subject change through the new intersubjective attunement to the associated milieu of the clouds? How could we describe this in the exemplary engagements? The encounter with the atmospheric processes was set up in such a way that the attunement towards the effects of the climatic conditions on our bodies and the clouds, as well as our own affective capacity, could become sensual through the different intensities underlying the process of becoming of the cloud. The felt intensity of the temperature above the heating plate or outside of it, of the humidity, and of the change in the observable formations of the clouds could be sensed in relation to each other and the perceivable phenomenon. If we become sensitive towards the different registers of these intensities, I will argue, we are enabled to respond to them. In the following, I will regard the exemplary engagements as implying a *mimetic faculty* that allows an attunement to the affective dimension of nonliving phenomena as well as living bodies—an intuitive understanding of how we have to behave in order to affect our environment in a certain way. The term *mimesis* comes with an extensive history spanning various fields of science, psychology, and the humanities. In psychology, it is increasingly related to empathy research, which argues

that mimesis as perspective-taking is crucial to feeling what an other feels (Chartrand and Bargh 1999).

The term *mimesis* goes back to the Greek verb *mimeisthai*, meaning “to imitate, to reproduce.” It has been central to aesthetic theory since Plato and Aristotle, for whom it referred to the imitation and reproduction of reality. In zoology, the term *mimicry* refers to the resemblance in appearance of a living organism to another organism or inanimate object (Encyclopedia Britannica 2019), as can be found in certain butterfly species and other insects, as well as vegetal life, where, for example, certain color patterns in plants deter predators. Here, mimesis can be found as a form of deception. Certain flower species, for example, have developed an appearance similar to other flowers in order to attract a pollinator without necessarily producing nectar in turn; the flower *Disa ferruginea* is also known, tellingly, as the non-rewarding orchid. In mammals, the affective communication between caregivers and their babies, namely, the mimetic play of their facial expressions, shows how mimesis has an important function in the development of a species’ offspring and its integration into a community.

Mimicry does not only serve as a communication principle between organisms; for humans in particular, mimetic communication allows us to conceive meaningful relations in different contexts, such as in nature, media environments, and social contexts. As a communicational principle that seems to run through all levels of behavior, mimetic communication “can be conceived as an example of synchrony ... connected to other rhythmic processes in the natural world” (Gibbs 2010, 187) as well as a “contagious process that takes place transversally across a topology connecting heterogeneous networks of media and conversation, statements and images, and bodies and things. These mimetic connections are a result of contagious processes in which affect plays a central part” (Gibbs 2010, 187). The aforementioned relation to empathy research goes back to this observation. Mimetic communication as a rhythmic, contagious, and affective process seems to cross common limitations of understanding, both in the sense of species boundaries and communication systems within a species. Insect pollination, for example, is based on the intimate bond between bee or butterfly and the phenology and odor of certain flowers.

Mimesis is also found in all forms of art. In the performative arts, mimetic communication can be seen as the “rhythmic process that structures behavior,” (Gibbs 2010, 191) a method to reproduce reality. Not seeing mimesis as “simple mimicry or copying dependent on vision (monkey see, monkey do), but as a complex communicative process in which other sensory and affective modalities are centrally involved” (Gibbs 2010, 191) gives us a “better understanding of the role of mimetic communication in social processes, and especially of the making-and breaking-of social bonds. These form the basis for a

sense of ‘belonging’ and, ultimately, of the polls, as what forms the affective bases of political orders” (Gibbs 2010, 191).

A mimetic relation following from attunement differs from a stigmergic relation, which has been described in the previous chapter. In both cases, the subject does not need to be conscious of the relation to the environment or the other it acts upon. But the effects this relation has on the subject differ. The actions of the stigmergic subject that follow from signals in the environment might or might not have an effect on the subject itself. And if it does, the subject would not be aware of it. The mimetic subject that I want to think with in this chapter integrates a pattern in nature or in an other into its own constitution; the pattern becomes part of its own behavior or appearance. Stigmergy and mimicry thus designate different levels of communication between subjects and their environments. What emerges from mimetic behavior can be understood as forms of subjectivation that might follow or integrate embodied action. What becomes central, then, for relation-building in atmospheric milieus via metabolic correspondences is the affective quality of mimetic communication between human actors as they interact in their environment, as well as between the human actors and the processes in the environment. In order to trace these two ways of mimetic communication in the prototypes of *Affective Atmospheres*, with the goal of explicating the possible new perspectives on the human-environment relation that emerge from them, I will turn to the mimetic capacity that seems to underlie both of them. Walter Benjamin’s notion of mimetic faculty will lead me, in the following, in bringing into view its connection with a way of being in the world that is inherently relational and aesthetic.

Mimesis and Non-Sensuous Perception

In the early 1930s, Walter Benjamin defined mimetic faculty as being placed in nature itself, and diverged in this way from the Aristotelian tradition in which mimesis was understood as the creation of art through humans. Yet, Benjamin saw the mimetic faculty especially developed in humans. According to Benjamin, the mimetic faculty of humans enables them to relate to a history that is both ontogenetical—as such, relating to the lifespan of a single human being—and phylogenetical—as in the relation to the prehistory of man (1986, 333). Humans, therefore, are able to produce similarities to things that are not currently present but are part of the individual history of a human being, such as in child’s play, when a child takes on the role of a merchant or windmill (Benjamin’s early-20th-century examples). The latter falls into the category of nonsensuous correspondences.

Expressions of the nonsensuous can be perceived in nonsensuous perception. This mode fills the gap between the human subject and the world, in

transferring it into a symbolic context, such as language, relating it to experience. Nonsensuous perception in humans, thus, is further related by Benjamin to the capacity to remember past experiences, and is therefore connected to a sense of self. As Husserl pointed out, being aware of past experiences comes with a sense of *mineness* (1923/24, 166) of experiences that strengthens the subject's sense of self in the moment of looking back. But Benjamin understood this self not as having a durable essence; just as the past appears as memory in the form of a "flash" and is not permanently present, the self is fleeting. Anthropologist Michael Taussig points out in his reading of Benjamin that "the past can be seized only as an image which flashes up at an instant when it can be recognized and is never seen again" (1993, 39). Recognition again marks the moment in which a past experience is related in a meaningful way to a current experience of a subject.

Benjamin's theory of nonsensuous perception and the acknowledgement of its situatedness results in a cultural critique. While, according to Benjamin, the faculty of humans to relate to nonsensuous correspondences in language has increased throughout human history, the faculty to relate to sensuous correspondences in nature has diminished. The human capacity to "stimulate and awaken" (Taussig 1993, 333) ultimately lost its ability to relate to the sensuous correspondence that forgoes language. Our existence, therefore, no longer includes the ability to relate to sensuous correspondences in nature. Everything is transmuted into language. Language thereby becomes an "archive of nonsensuous similarity: a medium into which the earlier powers of mimetic production and comprehension have passed without residue" (Taussig 1993, 336). This echoes Simondon's assessment of the relation between technology and culture as having been corrupted since the onset of industrialization: They have fallen out of phase. Technology is missing an aesthetic impression and culture a technological orientation (Simondon [1989b] 2016, 30).

In the following, I want to think about mimesis as acts of bodily involvements with the world, as aesthetic gestures that enact and communicate a shared reality with others. This enaction of a shared reality through mimesis will be further explored in the following alongside a close reading of engagements with the two prototypes. In *Affective Atmospheres*, I was interested in the ways mimetic behavior created a shared reality between people, but also between clouds and people. Understanding that a movement has a particular effect allows me to apply this movement purposefully, to mimic its effects. In the exemplary engagements with the clouds, the recognition of certain effects followed a moment of surprise, of recognition of a difference between the observable sensitivity of the clouds and the felt sensitivity of our own sense-apparatus. In the following, I understand this recognition of difference between a pre-supposed being-so of something and its coming to appearance in sense perception as a means for learning. If we, as I suggested

above, learned from the clouds by attuning to their processuality and to the climatic conditions that created the shared associated milieu, then we would become able to see the cloud in its potential becoming. This engagement with the environment that aims to enact certain formations in the clouds or cloud movements demonstrates the capacity to relate to something that is not present but that can potentially come to presence through a particular engagement with the associated milieu. Understood as an engagement with potentiality, in recognizing possible formations in the vapor through gestures, the anticipatory enaction of forms can be related to Benjamin's nonsensuous perception as part of the mimetic faculty. Something is enacted that is currently only present in its potentiality.

What if we were enabled to perceive nonsensuous correspondences that allowed us to "stimulate and awaken" potential formations of the clouds? Such a new and aestheticized relation with the atmosphere would have to follow a shift from what is perceived and anticipated based on previous experience towards an attunement to potentialities of experience that lie outside of our conscious reference to the world in our subjective, pre-reflective experience, through learning about the cloud's capability of being affected and that of our own bodies in the shared associated milieu of *Affective Atmospheres*.

How can we describe this shift further using the exemplary engagements with the clouds as our starting point? If the gestures and hand movements during the engagements were to be understood as mimetic behavior, they must have developed from something like an initial event, a moment of modification in the unfolding of experience. This initial event, I gather from my observations, was some kind of recognition of potential becoming of the clouds, based on a perceived pattern of formation in the clouds in relation to their milieu. I understand this recognition of a pattern and its mimetic enaction further as its being embodied into the behavioral patterns of gesture and movement. An example of this would be the observation of smoke-like structures above the heating plate and the evoking of smoke-like structures through newly developed bodily gestures in the vapor, which followed, I argue, from an embodied understanding of the climatic conditions that impacted these formations in the first place.

Towards a New Imagery of Climate

From Pre-Reflective Experience to Symbolic Reference

Is the incorporation and further development of gestures that follows observation, and more distinct recognition of certain formations, the same mode of experience as the spontaneous and uncoordinated play in a first encounter with the clouds? I argue that there is a shift in perspective that might best be described as the shift from Whitehead's perception in the

mode of presentational immediacy towards symbolic reference. Symbolic reference would be the phase that synthesizes the felt intensity of the causal efficacy with the recognition of difference in the subjectively unified process of presentational immediacy, which allows one to intentionally engage with the qualities of the clouds. This is analogous to the encounter with the processual medium that thereby reveals the processual nature of perception and meaning-making itself, which I mentioned before. I propose that what comes with the recognition of the cloud structures as emerging from climatic conditions, which can be sensed and impacted through bodily engagement, is the subjective experience of these unfolding interrelations in and with the environment.

To go further from here, it is useful to concretize how we can understand consciousness as emerging from an ongoing interrelation with the world. Aesthetic experience as the sense for potentiality is considered not only to enable new meaningful relations, but also to change our pre-conceptions about the world and, consequently, how we reflect our own being in the world. This process will be exemplified with the proposition that the engagements in *Affective Atmospheres* led to a change in how we think about climate—not only as an abstract concept, but also as an aspect of our everyday experience.

The way an actual entity prehends an occasion of experience is, for Whitehead, due to its subjective form and can be as various as emotions, valuations, purposes, and so on ([1929] 1985, 24). When I put my hand into the vapor above the heating plate, my expectation of warmth could be understood as my subjective form of prehending the vapor. I only realized my expectation the moment I felt something unexpected, yet it informed the way I engaged with the plate. Accordingly, the subjective form for Whitehead does not designate consciousness. Consciousness only emerges in a few entities and only under certain conditions (Whitehead [1929] 1985, 162). What is experienced (also consciously) is always an extraction from a process that happens continuously, because every experience is simultaneously the experience of the whole and a single and passing event. Identity of the self, for Whitehead, is thus something time-based and fleeting. If we relate this back to the observations of encounters with cloud formations in the prototypes and assume that a subject is not something solid but instead an ensemble of meaningful relationships enabled by experiences, the metabolic dimension of this relational subjectivity comes into view in the processual, transformative engagement with atmospheric milieus.

But how can the becoming conscious of an experience as positive prehension lead to a new perspective on the larger scale of being in the world? How can an environmental, metabolic perspective arise that does not solely center around the conscious mode of relating to the world? As I have argued in reference to Dewey throughout this book, an aesthetic experience is

characterized by the overcoming of an obstacle, a tension, encountered in the world within the particular frame of a situation. In the aesthetic experience of atmospheric processes outlined here, these obstacles lie in the sense-making process of phase-changes within the material and the engagement of different senses in order to assign meaning to the relational properties of perceivable patterns. What is at stake in the following is precisely the question of how we can account for subjective experience of processes in atmospheric milieus while revealing this subjectivity itself as processual, which then would also have an impact on our conception of being in the world.

The Potential of a New World

As I pointed out with Seel, in aesthetic perception, we perceive something in such a way that it relates to our life situation in a particular manner. Our expectations regarding the sensual feel of the vapor above the plate, of its movements in the air flow, relate back to our pre-conceptions about natural phenomena. We know from previous experience how it feels to be close to an object that emanates heat. We have observed clouds moving fast or slowly across the sky, depending on how windy it was. In being confronted with this moment of surprise, in which our pre-conceptions are challenged, we might re-contextualize the phenomena we were engaging with and also how we came to our pre-conceptions in the first place. Our synaesthetic capacity to attend to climatic processes in our environment starts to matter and becomes a source for novel experiences apart from the world as its being-so.

Every time we face a discrepancy between our expectations or common ways of dealing with the world and the actual reality, the solution of that discrepancy might provide us with a new perspective. In these so-called “aha” experiences, we can get a glimpse of a reality, a world outside of what we used to know:

Going through ‘an experience’ changes things for the subject of that experience, because that subject is formed by way of the experience ... In our Ah ha! moment we might come to feel, for instance, a difference between appearance and ‘reality’: that appearance is not necessarily what we took it to be but is something more. The emergence of a new ‘world’ thus becomes a possibility, but that possibility must first be grasped in the imagistic form of presentational symbolism before it can be discursively articulated using the symbols of language. (Stenner 2018, 83.)

What Stenner describes here is learning as a creative process and active engagement with the world. Before a “new ‘world’” can emerge, the presentational symbols that originate in discursive symbolism are derailed. This initiates the liminal process in which new images and new forms of presentation can emerge, which can then be reintegrated into the symbolic

discourse as “representational thought” (Stenner 2018, 83). The “emergence of a new ‘world,’” the recognition of possibilities, thus precedes the linguistic conception of the discursive symbolism. In presentational symbolism, there is already a context of meaning that can grasp the possibility as an “imagistic form.” This context of meaning is not fixed.

In what Stenner calls *liminal experiences*, that is, experiences that transgress the boundaries of the previously established context of meaning, the context itself changes. In this transgression of limits of meaning we confront something new. In expanding the context of meaning to include this new experience, a process is initiated that might lead to a linguistic redefinition of the new experience. Although we might not be able to become fully aware of these processes that enable, compose, and condition our conscious perception, in aesthetic experience, we still can catch a glance of them that feeds into our imagination, a glance of our sense-making. And it is especially this sense of an outside of our representational relationship to the world that can lead to a shift in the perspective on our being in the world.

If we then understand the engagement with the clouds as it follows from an anticipation of climatic processes and their impact on observable phenomena, and as a way to communicate a meaningful relationship with the environment, what would that entail for the status of the conceptual reference of the material at stake here—the cloud, or rather, that which conditioned the perceivability of the cloud: climate? What comes into view is a contact zone of material and energetic processes, of living and nonliving bodies, that is highly problematic today. The aesthetic milieu of *Affective Atmospheres* offered ways to have a subjective experience of being embedded in this contact zone, of being affected by and affecting climatic conditions as they enact occasions for experience. I will further explicate this proposition and point out its implications for a theory of a practical aesthetics as it derives from and engages with the everyday.

The meteorological variables such as temperature, humidity, pressure, and wind created a specific context of experience whereby the concept of climate became explicit. Climate could be conceived of in multiple ways: as something in which we could participate, something we could observe, and something that affects our experience. But we could also communicate these affective relations to others—not in their abstracted form, but while they are unfolding in front of us. As Dewey says, “when communication occurs, all natural events are subject to reconsideration and revision; they are re-adapted to meet the requirements of conversation, whether it be public discourse or that preliminary discourse termed thinking. Events turn into objects, things with a meaning” ([1925] 1994, 166). The reconsideration and revision of climate and one’s own role within climatic conditioned environments in *Affective Atmospheres* was at once enabled through new positive prehensions with the world

and gave way to further positive prehensions. Such an embodiment of the conception of climate differs from an experience mediated by a screen, a graph, or other representational forms, or even by language, because its appearance and behavior cannot be distinguished from its sensual experience.

Aesthetic milieus like *Affective Atmospheres* allow us to approach an abstract concept such as climate in a tangible and embodied manner. But how can such an experience and extension of a concept lead to new ways of acting in everyday life? Imagination takes on a crucial role in responding to that question.

The Re-Construction of Habits in Atmospheric Milieus

The recognition of a similarity that can be seen as the foundational spark for a new relation comes with an active engagement with the environment. Thinking about it together with aesthetic perception, or with nonsensuous perception, as the capacity that allows humans to represent something that is not present stresses its creative and productive quality. Besides the productivity of these two notions of perception, for the exploration of this process of meaning-making in experience, I will now introduce Dewey's notion of imagination to move the discussion into the realm of education.

For Dewey, the term "imagination" plays a central part in his philosophy; he saw imagination underacknowledged in his time:

'Imagination' shares with 'beauty' the doubtful honor of being the chief theme in esthetic writings of enthusiastic ignorance. More perhaps than any other phase of human contribution, it has been treated as a special and self-contained faculty, differing from others in possession of mysterious potencies. Yet if we judge its nature from the creation of works of art, it designates a quality that animates and pervades all processes of making and observation. It is a way of seeing and feeling things as they compose an integral whole (Dewey [1934] 1980, 267).

Imagination, then, is more than just a synthetizing activity of the mind. Imagination is the creative force of meaning-making that is active, when "varied materials of sense quality, emotion, and meaning come together in a union that marks a new birth in the world" (Dewey [1934] 1980, 267). Experience is described by Dewey as having an active and a passive phase:

When we experience something we act upon it, we do something with it; then we suffer or undergo the consequences. We do something to the thing and then it does something to us in return: such is the peculiar combination. The connection of these two phases of experience measures the fruitfulness or value of the experience. ([1916] 1944, 163)

Both phases must be understood in a circular way as interdependent and as that process that embeds the organism in its environment. In this circular movement of experience, the environment as the context of experience itself is being changed. Even though the conditions of an environment create the context of experience, the experiencing “live creature” (Dewey [1934] 1980) can, by critically reflecting and communicating these reflections, and by changing the habitual patterns, change those very conditions. This would be part of the active phase of experience, which is identified with judgement as the ability to critically reflect on the context of experience. For Dewey, this is why this processual notion of experience is central to his educational theory as well. For him, it is because of this natural conception of the organism being embedded in its environment in constant and reciprocal exchange that learning is possible. It followed that, if human experiences do not align with both phases, are not critically reflected upon, and if the consequences of these reflections are not incorporated into habitual manners, then we would remain passive, purely driven by external cues.

It is in passive experience that something absent is made present and, as such, also made potential outcomes of actions. Thus, it is precisely in imagination that possible consequences of actions for oneself or for others are acknowledged in experience: “The engagement of the imagination is the only thing that makes any activity more than mechanical” (Dewey [1934] 1980, 236). Imagination, thereby, allows, for Dewey, for novelty:

There is always a gap between the here and now of direct interaction and the past interactions whose funded result constitutes the meanings with which we grasp and understand what is now occurring. Because of this gap, all conscious perception involves a risk; it is a venture into the unknown, for as it assimilates the present to the past it also brings about some reconstruction of that past. When past and present fit exactly into one another, when there is only recurrence, complete uniformity, the resulting experience is routine and mechanical; it does not come to consciousness in perception. The inertia of habit overrides adaptation of the meaning of the here and now with that of experiences, without which there is no consciousness, the imaginative phase of experience. ([1934] 1980, 272)

In the imaginative phase of experience, we become open to the potentiality of experience; it is here where aesthetic perception, in Seel’s sense, could be placed as a way to enable, to start-off, this phase.

Habits come into this process at different stages; they can prevent new experiences or allow for new ones, and they change constantly. Habits, in this sense, express our involvement with the world. If habits do not lead to expected consequences, new habits must be formed. Forming habits in a reflective way

aims at having a complete and fulfilled experience of the world. As Dewey states: “[t]hinking, in other words, is the intentional endeavour to discover specific connections between something which we do and the consequences which result, so that the two become continuous” ([1916] 1944, 145). In this continuation lies the enjoyment of aesthetic experience. Thinking here is identified with the active phase of experience. The observations of cloud formations and the search for gestures that would have a certain effect on them might then express this process of experiencing a new context—climate—and discovering the elemental dependencies in understanding that air flow applies pressure on the clouds, which results in different observable patterns. Acting on these observations is an example of the development of new habits as a consequence of the engagement with the environment.

We can sum up that for Dewey, the circular movement of experience involves both imagination and thinking. Unconscious and non-intentional activities find fulfillment in conscious perception as it all happens in continuous exchange with the environment. As an example Dewey describes the creative work of a painter as following this circular movement of experience:

An incredible amount of observation and of the kind of intelligence that is exercised in perception of qualitative relations characterizes creative work in art. The relations must be noted not only with respect to one another, two by two, but in connection with the whole under construction; they are exercised in imagination as well as in observation. Irrelevancies arise that are tempting distractions; digressions suggest themselves in the guise of enrichments. There are occasions when the grasp of the dominant idea grows faint, and then the artist is moved unconsciously to fill in until his thought grows strong again. The real work of an artist is to build up an experience that is coherent in perception while moving with constant change in its development. ([1934] 1980, 52)

Thus, imagination, observation, and reflection as relations between the experiencing subject and its environment are not fixed, and are not to be distinguished from one another either, but are in a dynamic and constant process of interrelating.

If we now understand the engagement with the clouds in *Affective Atmospheres* as an exercise of all those different phases of experience as they led from unconscious, aimless play to observations and imaginative form-seeking gestures, and finally to intentional, anticipating actions, collective behavior and verbal communication, then it might be fair to say that the context of experience of the aesthetic milieu enabled learning, and thereby new forms of subjectivation. The context as the conditioned experiences of climate evoked new habits, such as the mediating gestures between the atmospheric processes and the visitors, new reflections on the interdependencies of

climatic elements, and possibly new concepts and imageries of climate as well, which might impact our future engagement with the world.

Towards a Metabolic Aesthetics of Climate

Affective Atmospheres as an interdisciplinary research project aimed to provide an opportunity for experimenting, experiencing, and interacting within a climate-conditioned, responsive media environment that would also respond to inquiries from different disciplines and invite various audiences. The aesthetic experiences that the two prototypes afforded formed the basis for the further development of propositions and speculations about how we humans can make new connections with our climatic environments, and which feelings, sensory experiences, and possibilities of action are enabled thereby.

With *Affective Atmospheres*, I explored how the shift in perception in aesthetic experience enables an anticipatory engagement with an ephemeral medium, like clouds. I argued that this engagement followed from the perception, or, we might say, prehension, of potential formations based on an attunement towards the shared milieu. Bringing water, vapor, and clouds into resonance with climatic processes enabled an experience of the cloud's movements and behavior in relation to changed climatic conditions. I proposed further that, in engaging with them, we started to learn from the affective capacities of the clouds. The observations of the water creating bubbles, vapor of different densities, and, finally, clouds emerging from the aquarium and expanding into the space surrounding it were accompanied by different sensual experiences. We know that vapor has a different density than our bodies. But understanding this difference through the experience of the effects of airflow on ourselves in comparison to the effects on the vapor, I have argued, enriches our lived experience of being spatially present among other, also atmospheric entities.

In order to examine this intimate zone between our bodies and the climatic phenomena, I related the way clouds would form to Simondon's concept of transduction, and the environmental dependencies to his notion of the associated milieu. While this exploration, up to a point, provided me with an idea of the ways an aesthetics of metabolism could help us attune to the climatic phenomena with which we share an environment, I further addressed the possibility that such a subjective, embodied experience could also lead to new symbolic references. The shift from aesthetic experience to the formation of new knowledge about a climatic phenomenon concluded this chapter, by relating mimicry as a way to recognize a similarity that allows for prehension and Dewey's understanding of aesthetic experience as part of learning, of opening up a new world. Therefore, a metabolic aesthetics not only allows us to gain a sensitivity to the effects of processes and phenomena that are

spatially and temporally on a different plane not directly accessible to our subjective experience, but also enables new conceptual knowledge.

Conclusion: Towards a Metabolic Aesthetic

In this book, I have proposed an aesthetics of metabolism that accounts for phases in subjective experience in which processes of transformation, production, repulsion, and containment relate to sensual and emotional-affective experience. These processes can be bio-chemical activities internal to bodies or register outside of bodies in the environment.

What I propose, in short, is a relational approach towards aesthetics that allows us to describe the experience of processes. An aesthetics of metabolism enables a reflection on a certain orientation to the world, a perspective that is open to affective processes that usually form the background of our experience. I have deliberately chosen a speculative approach in this book, and, while thinking with a number of scholars across disciplines, artists, and artworks, I have refused to center it on a single theory or aesthetic concept. The idea of an aesthetics of metabolism is an invitation to shift our perspective towards those processes inside our bodies and around us that happen continuously and can potentially be experienced in different phases and on different levels of our consciousness. By exploring different aesthetic milieus, I have given the opportunity to exercise this shift and to show that our surroundings are always full of opportunities to perceive in an aesthetic way.

Noticeable is a trend in the contemporary design of living spaces that increasingly offers such a shift towards an aesthetic perception of the processuality at the root of experience. Thus, as my examples have shown, an aesthetics of metabolism does not necessarily have to be reinvented—it is already inherent to our everyday encounters with the world. What is needed instead is, on the one hand, an intensification of existing aspects in our surroundings that make us shift our attention towards the atmospheric and metabolic interrelationships that embed us in the world, and, on the other hand, a way of practicing this shift in the everyday. Design of our everyday environments and individual practice must go together; this comes to light with the fact that atmospheric processes and other bodies, both human and non-human, come with a materiality and affectability that cannot be eliminated in a design strategy. It is therefore important to become aware of the ongoing processes of differentiation that are inherent to the assemblages of atmospheres, materials, algae, people, and so on.

By attending to the atmospheric and metabolic relations that embed us in the world, we can better understand how our interrelationships with the world are continuously configured through material and affective processes. Design and architecture that bring into resonance the inherent disparities of these interrelationships, instead of obscuring them with ideas of balance and resilience, give us the opportunity to attune to other, processual levels of the relations between humans and their environment. Even if not explicitly

politically motivated, such a move towards a sensitization to what usually remains unnoticed is deeply rooted in ethical and aesthetic considerations.

The introduction of terms like interoception, stigmergy, prehension, and intersubjectivity into aesthetic theory to describe this new access in an aesthetics of metabolism follows the identified need to expand the vocabulary able to describe the aesthetic effects of metabolic processes. Living in a time in which our understanding of vegetal and animal life, planetary processes, and the role of the human on a planetary scale are constantly being reshaped, the necessity of conceptual knowledge in aesthetic theory that goes beyond the boundaries of the sensually perceivable seems necessary. In facing the limits of human comprehension in these matters, speaking about our common surroundings as sensitive or sentient no longer falls into the realm of pseudoscience. At the same time, we are aware today of how comparatively small the part of our experience that we are conscious of is. Aesthetic milieus such as those described in this text can mediate what is usually on the verge of conscious perception. In intensifying, visualizing, or immersing the experiencing subject, they enable new ways of attuning to a rhythm that usually remains unnoticed, but that interrelate us with our surrounding environment.

While climate change is causing heat waves, droughts, and rising sea levels in many parts of the world, everyday perception, especially in industrialized countries, lacks references that would enable an affective and experiential engagement. This conclusion invites the reader to think about a metabolic aesthetics as part of a larger undertaking that argues for a re-thinking of the ways we inhabit our environments and how we deal with phenomena that are difficult to grasp sensually, such as local effects of climate change.

Attuning to Processes

Even though our awareness is mostly directed at the content of our experience—at objects, possibilities of action, goals—and not at the way our senses make these objects present to us in perception, these processes that usually remain in the background of our conscious awareness can potentially come to the fore.

This shift in perspective can be practiced. To better understand how, it is helpful to know some aspects of aesthetic perception I have highlighted in my examination of the artworks throughout this book: In chapter three, I described how, in aesthetic perception, an object or a situation are not considered in their being-so, but in their appearing (Seel 2005, 89). In Rahm's aesthetic milieus, this allowed us to shift our attention towards the biological part of being as a bio-cultural creature. The second aspect of aesthetic perception I focused on was that, in aesthetic perception, we relate a specific situation

or object in its appearing to our own individual life situation (Seel 2005, 95). We come to see how an object or situation corresponds with different contexts we are familiar with. I traced this aspect in both *Urban Algae Canopy* and *Oxygenator*. The third aspect of aesthetic perception that I have investigated is that of the emergent sense of potentiality (Seel 2005, 102). This emergent sense of potentiality might ultimately create a generative link between embodied experience and abstract thinking.

While aesthetic perception can be practiced and integrated into our everyday encounters, aesthetic experience, too, has to be seen as an operation, a process, instead of an experiential state. Aesthetic experience, as Dewey describes it, assigns meaning to an event or a sequence of events. Something starts to make sense for a subject in experience. Meaning is thus not only generative—in placing it within the process of experience, it is suggested to be processual itself. Aesthetic experience, in Dewey's view, allows one to further learn from experience. Even though aesthetic experience is, in this way, non-ordinary, Dewey situates it in daily life (Dewey [1934] 1980, 3). If aesthetic perception can be practiced as a mode of everyday perception, it might enable us to have aesthetic experiences in unexpected contexts. Practicing aesthetic perception and expanding our access to subjective experience, then, means ultimately forming new, intimate connections with the world and those with whom we share the world.

Following this statement, a key argument of my book has been that the concept of metabolism can facilitate a turn towards processes and away from subject-object dichotomies, and ultimately towards a reconfigured conception of the relation between human and environment. I have termed this perspective able to account for processes as part of meaningful experience “metabolic subjectivity.” In a metabolic subjectivity understood as a certain perspective, a sense of processuality remains—both regarding *what* is perceived and *how* it is perceived.

The proposal to see aesthetic experience as a way to enrich our subjective experience in the everyday and to become attentive to the ways abstract thoughts are primed by pre-reflective experiences is tempting, and it is certainly not new. Other inquiries into subjective experience that can be found in certain scientific methods, such as the micro-phenomenological interview or practices like mindfulness meditation (Kabat-Zinn 2012), seem to enlarge our access to the pre-reflective realm of our subjective experience, to the *how* of our experience. Both of these two examples, micro-phenomenology and mindfulness meditation, try to deepen the experience of what happens between experience in the “raw” and our cognitive interpretation of it. While, in a micro-phenomenological interview, the interviewer continues to question the use of conceptualizing, objectifying terms by the interviewee to describe an experience, many meditation techniques suggest perceiving emerging

thoughts from a detached perspective, as arising and fleeting in a manner similar to sounds, feelings, or emotions that can be considered from a distance during meditation.

Turning to our relationships with the environment expands the process of experience and also includes, besides subjective experience, the affectivity and affectability of others. Regarding our built environment from a metabolic perspective, the potential of architecture and design becomes significant. By aestheticizing our environments, by creating spaces that draw our attention to processes of interrelation in everyday life, we can speculate about long-term effects on our co-existence that are on a scale different than mediation and individual lines of research.

Designing for Sensitive Encounters

To formulate an aesthetics that can account for the subjective, pre-reflective experience of metabolic interrelations, as well as the sensuously perceivable effects on our own bodies and their immediate environment, I chose to explore installations that deliberately use climatic processes as media for experience. More precisely, I have concentrated on artistic works that use elemental media, such as air and water, as well as temperature, in order to make the transformative effects specific to these media on our living bodies and our environments tangible.

I understood them as aesthetic milieus that intensify metabolic processes, and that condense subjective experience of these processes in such a way that they potentially lead to a new sensitivity for the bio-chemical dimension that embeds us in the world; following that, they potentially enable a new perspective on the relation between human and environment. Subjective, pre-reflective experience of climatic processes was thereby transferred into a new and meaningful context, in which the surrounding world understood as climatically conditioned could not be regarded as separate from our own body and our lived experience.

In my investigation of artworks, I have described the different phases of experience that come with intensities that can be felt on a phenomenological level, but that also point to an underlying processuality that withdraws from the phenomenological grasp. A focus on metabolic processes has allowed me to explore these dimensions of experience, as they are not distinguished but are rather interconnected with biological, social, habitual, and rational dimensions of being. Metabolic processes traverse these dimensions; they can be found internally to bodies, externally in our surroundings, and at diverse thresholds between what we used to refer to as the inner and outer domain of organisms.

The experience of shared metabolic pathways allows us to shift the attention from an individual's becoming to becoming with others. Despret's notion of care illustrates how the expectations of a possible becoming of an other I care for changes not only the other, but also myself. Thinking with Whitehead about this becoming-with brings into view the underlying operations of this process. Whitehead used the notion of prehension to explain how the prehending entity takes aspects of the prehended entity into its own composition. Both are changed in this process, which Whitehead describes as the "many becoming one and being increased by one" ([1929] 1985, 21).

If prehension as a form of understanding something about an encountered entity or situation operates in changing the subject-in-understanding itself, then there is no graspable essence to be understood, as the process of understanding is moved into the understanding subject as it interrelates with the object itself. The becoming aware of traces of metabolic interrelations in the environment, then, can be described as meaningful without the need to identify a distinct cause. Through sharing metabolic pathways, the other is always already part of myself and my sensual apparatus. Aesthetic milieus allow us to explore such interdependencies experientially. As we have seen in *Urban Algae Canopy*, taking inspiration from concepts like stigmergy to create multi-species environments has the potential to bring into view the inherent activity and affectivity of matter and nonhuman organisms. Taking this aspect further, I have proposed the notion of a stigmergic subject to illustrate the embodiment of such a perspective.

The stigmergic subject is a decentered one; it designates reciprocally influential and dynamic interactions between environments and organisms. Here, it is less another subject or object that communicates something to a subject, and more the environment itself. While registering and expressing perceivable patterns that might bare meaning and suggest certain actions to a subject, the subject is not necessarily conscious of these suggestions or of a larger context in which they are placed. If we take the ideas of prehension and stigmergy as a way to explore aesthetic experience following from a form of attention and care that is on a pre-reflective level, the evasiveness of the biochemical dimension does not stand in the way of meaningful experience. An aesthetics of metabolism might, then, enable us to intersubjectively attune to processes that follow a non-human rhythm.

Mimicry is another fruitful notion for thinking about these affective relations between climatic phenomena and humans. To illustrate the role of mimicry for an aesthetics of metabolism, I described it in chapter five as emerging from an attentiveness and sensitivity to the effects the articulation of climatic phenomena had on our sensuous experience. In this sense, mimicry also tells us something about the way our expectations impact how we perceive our environment and how we act in it, but also, at the same time, how new

expectations can form from prehending an otherness in sensuous experience. Learning through mimicry about phenomena in our surroundings, and about how they change and behave due to certain effects that we can also become sensitive towards, we learn about our own bodies as well: how they can be affected in different ways and what effects our bodies, certain gestures, and so on have on phenomena that behave very differently within a shared environment. Here again, the aesthetic milieu provides a way to attune to a different rhythm—that of convection, dissipation, and conduction.

So what is an aesthetics of metabolism then? An aesthetics of metabolism can be understood as a new form of access to the world that considers experience as processes of transformation, production, repulsion, and containment, with a special focus on how they enable us to engage with our surroundings and how we gain a sense of self through these engagements.

Can an aesthetics of metabolism thus allow for a meaningful experience, a form of knowledge that has a sense of its own preliminary nature? Or does an aesthetics of metabolism remain evasive, intangible, invisible? Does a metabolic aesthetic leave us with vague feelings, and unspecific sensations of processes that seem to affect us in one way or another?

I hope a metabolic aesthetics as I have described it offers more than that. I hope to have cast light on how the multisensorial capacity of bodies can impact collective action and how, consequently, aesthetic experience is central to the formation of subjectivities. In the case of aesthetic experience of metabolic processes, these subjectivities account for the bio-chemical inter-relations that embed us in the world.

Broader Implications of an Aesthetics of Metabolism

Before coming to the end of this study, I will turn towards possible implications that an aesthetics that accounts for processes of interrelating might have in the future for the ways we relate to our environment, as well as to others we are sharing our environment with. The current debate about atmospheric architecture and the role our built environment plays in making tangible the impact our changing climate has on our everyday life identifies some possible impacts of such an aesthetics. If urban infrastructures begin to mediate atmospheric flows instead of creating static climatic conditions, an aesthetic sense for our bio-chemical dimension might prosper.

To develop a perspective that accounts for those metabolic pathways that allow for living processes to evolve in the first place, we have to fundamentally shift the angle of our inhabitation of the world, and how we design our habits: away from structures and visual cues that establish a functional relationship with our surroundings towards the energetic and material flows of air,

water, and energy, which are usually hidden behind the concrete, invisible to our eyes.

If architecture begins to design atmospheres that shift our attention from designed objects towards situations and conditions for experience, we can learn to attune to their metabolic effects. In this way, future habitats that might be organized along the new, sensuous experience of our bio-chemical relations with the world would not just create new domains of experience, but also new—metabolic—subjectivities. Creative practices that explore the experiences enabled by atmospheric milieus as part of living environments can show the critical thresholds that bring atmospheric and metabolic processes to the foreground and thereby tell us something about the way we derive meaning from these pre-reflective involvements with the world. Thereby, the operations that introduce the formation of new relations within these environments—and the entities that participate in these operations—can become explicit.

This sensitivity towards the ways invisible, affective forces around us impact our bodies, feelings, thoughts, and actions might allow, furthermore, an awareness for how we are always already pushed to certain actions without the chance to reflect on the affective stimuli we are responding to. Power structures implemented in our surroundings enter the dimension of the sensuous without conscious notice, and inform our actions and decision-making. Our preferences, expectations, and evaluations are far from being origins of some pure subjective engagement with the world; they are shaped by the contexts of our experience, and embodied and habitualized in ongoing processes of subjectivation. In this sense, an aesthetics of metabolism is being expanded beyond an artistic, philosophical context towards processes of subjectivation.

I propose understanding this orientation towards metabolic processes as a practice of re-imagining our relation to the world based on a foundational interrelatedness. Aesthetic experience of metabolic processes enables us, in this way, to get a sense of processuality at the root of meaning-making. It can further make us aware of new relations with the world that start to matter because they can be sensed as a part of ourselves while at the same time maintaining the limitations of that relation.

When I now climb up a hill in a tropical environment, I pay attention to the density of the air, to the ways humidity seems to always compromise my breathing. I have come to realize that this sensitivity towards the air and how it impacts my ability to hike does, indeed, increase my awareness of my surroundings, just as it creates an awareness of the ways internal processes can draw my full attention. What is central to a metabolic perspective on these different ways of perceiving my relation to the environment is that they

are connected; they are different expressions of my metabolic interrelation with the world. On these occasions, I feel the dampness on my skin, and I am aware of the barely visible thin veil of microscopically small drops of water that seems to interfere with the view. I am also aware that, under such circumstances, speaking is especially hard for me. I am at my best under climatically challenging conditions, when I am quiet and able to just listen to my breath, to the sound of my footsteps. I also recognized that this sensitivity can intensify unwanted feelings, such as the chill triggered by airflow, which can occupy my full attention, leading to thoughts like “will I catch a cold?” or “did I pack a second shirt?” New experiences and new knowledge mostly come with the demand for further regulation, reflection, and practice. In this sense, I hope that a world will be preserved that includes many different climates, seasons, and rich biodiversity, and that we as animals among animals can continue to experience and learn about the countless ways our bodies can be affected, how we affect our environment, and how we are involved in myriad metabolic and affective relationships with other forms of life.

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