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Thinking with the world – to explore the becoming of phenomena

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Abstract

This article discusses how it is possible to think *with* the world in educational research. How can this thinking with the world generate knowledge about the becoming of phenomena? To answer this question this paper undertakes a diffractive reading of selected texts from Niels Bohr, Karen Barad, Gilles Deleuze, Felix Guattari, Donna Haraway, and Michel Serres. This diffractive reading reveals that the world becomes with itself contributing to an internal principle or an inner *self-differentiation*. This means that all phenomena can be understood as related to the world in one way or another. This paper contends that the researcher body is important to investigations of the becoming of phenomena with the world, therefore a *haptic sensorium* is developed as a means to visualize bodily affects and to recognize *limit values* to the world, for example, background noise. The article concludes with a discussion about creating knowledge of this process as a *rhizome*. The article attempts to illustrate that thinking with the world can generate new knowledge to understand the becoming of phenomena, which can contribute to the development of educational research.

Keywords: posthumanism, self-differentiation, haptic sensorium, limit values, rhizome.

Introduction: Join the world

We know little about the world. We are and will always be in the midst of an enigma, given the world's complexity and diversity it is impossible that we will ever fully understand it. However, we must not stop asking questions of the world; we need to pursue ways to better understand how we become-with it. This will help us to understand how important the relation to the world is when phenomena come into being. Such a project assists in appreciating the challenges that the earth is facing today and what might be potentiated from finding fresh optics from a process ontology orientation.

In this article, I think *with* the world in an attempt to theorise the becoming of phenomena. In so doing, I aim to give an understanding of how phenomena such as language, bodies, nature and materiality come into being. What is needed in research today is a more in-depth ontological discussion of what it means to become-with the world. Therefore, this article explores the following questions: How is it possible to think with the world? How can thinking with the world generate knowledge about the becoming of phenomena? Addressing these questions can contribute to the development of theories and methods for educational research that take knowledge production in worldly directions.

To answer these questions, theoretical inspiration has primarily been taken from the fields of posthumanism and new materialism. The study offers a diffractive reading of chosen texts from Niels Bohr, Karen Barad, Gilles Deleuze, Felix Guattari, Donna Haraway and Michel Serres. Diffraction is a concept that comes from physics and optics and describes what happens if parallel light is allowed to fall on an opening in an opaque wall. The rays expand so that the image of the aperture captured on a screen becomes larger than it would be if the rays propagated completely rectilinearly (Haraway, 2004). Similarly, this article is a result of texts being mixed and read across each other, with an interest in how this makes thinking with the world a way to create new knowledge.

I start by presenting some concepts that have become important to developing understandings about how it is possible to think with the world. I begin with the relationship between language and the world. When posthumanism and new materialism discuss the world today the concept *wor(l)ding* (Barad, 2007) is often mobilised. Barad uses this concept to show how language and the world connect. Which at the same time indicates that there is an ongoing openness and mobility in the exploration of and with the world (Juelskjær 2019). The term "worlding" was first used by the English poet Thomas Drant in the mid-16th century. In contemporary research, Andersson and Harrison point out that worlding does not refer to a preserved thing but rather to the context or the background against which certain things emerge and become significant (Anderson & Harrison, 2010).

How language and the world connect was also of concern to quantum physicist Niels Bohr. He claimed that we are dependent on language, but at the same time are living in a world that we are a part of and are co-creating (Bohr, 2013). Quantum physics uses language and refines physical terminology to communicate what questions have been asked of nature. Bohr did not mean that physics has the answer to everything – rather he was trying to demonstrate that even the smallest particles on earth have a lot to tell us about relations with the world.

Karen Barad (2007) was inspired by Bohr when she develops the concept of *agential realism*, which states that matter has an agential potential in itself, which is not always identified and represented by human language (Barad 2007). It is interesting to see what she say about agents: she define these as neither subjects nor objects, but as the space created from the effect of the

world in which the phenomenon is located. A co-action with the world creates what Barad (2007) calls a *phenomenon*. All things are phenomena that are specific to the very circumstances that have been involved in creating them, all bodies, not just the human body, are created from ongoing performativity, a constant doing (Barad, 2007).

Deleuze & Guattari (2015) offer an important contribution to debates about how phenomenon become with a co-action with the world. They argue that it is crucial to see what the world can do: its functions and its effects. For Deleuze & Guattari (op cit.,) the world is a substance that is a non-A and A simultaneously, a *substance* to which all phenomena that arise must relate in one way or another. *This is why it is possible to say that we can think with the world*. As it cannot be seized or controlled, it is free in itself, but at the same time, the world cannot see itself or reflect (Christensen, 2018).

Based on these ontological starting points, I want to continue to ask how we think with the world when we as researchers study phenomena of various kinds. To explore this, a *haptic sensorium* is created to follow the phenomena' relations with the world. Special focus is placed on *limit values* to the world, for example, background noise, a noisy noise, a sound of chaos (Serres, 1998). These limit values allow for discoveries of how phenomena becoming in relation with the world. The article finishes by discussing how it is possible to find a way of showing phenomena becoming with the world. Here a form of cartography is presented that resembles Deleuze and Guattari ‘s *rhizome*, a figuration that draws attention to a flow that moves in many different directions and thus also allows for unlimited growth.

Our relationship with the world

In the 1920s, Bohr and Albert Einstein went to Copenhagen to debate the extent to which the instruments of physical experiments influenced the physical world (Favrholdt, 2009; Bohr, 2013). Einstein believed that the influence of the instruments in a laboratory could be eliminated to arrive at objective and true knowledge. Bohr held the opposite view, believing that everything affects everything and that what happens in the material world interacts with instruments and human observations. Bohr said that we can never observe from the outside and consider what we see to be an objective reality; with instruments and interpretations, we disrupt and change what we study. The way we observe will affect the discoveries made. How reality comes about and how it can be understood is determined by how research is arranged, which means that research will materialise as something specific to the context in which it takes place.

At the beginning of the 20th century, there was a discussion within physics about how light could be understood. Was it a wave or a particle (Favrholdt, 2009; Bohr, 2013)? Research with certain instruments had discovered that light created electrons and photons as particles. This was done by destroying the disturbance that distinguished them as waves and motion. They could then be located as units that appeared in one place and not in two locations at the same time. However, other instruments did the reverse, destroying the disturbance that distinguished them as particles

and, instead, created electrons and photons as motion and waves. It was not completely possible to observe light, but it was the choice of instruments that determined what was discovered. This shows that the important thing is our *"relationship with the world",* Bohr said, not our pictures of it (2013, p. 22). The only thing, therefore, we know anything about is the interconnections that arise in the relationship between measuring instruments and what we are exploring (Bohr, 2013).

The crucial thing is that we are dealing with phenomena that are beyond a deterministic pictorial description. The conditions for what we can know are limited by the fact that there is something we cannot know anything about. What remains is to use our common language and refine this with a physical terminology to communicate what questions we have asked nature: "We are dependent on language, but at the same time, there is a world that we are part of and create together with" (Bohr, 2013, p. 22). We are both participants and spectators at the same time. We become with the world and at the same time, we create ourselves at a distance from the world. It is not about trying to understand the world in itself and nor finding its innermost being, its essence, as this makes no sense. All we can do, according to Bohr, is persistently generate descriptive accounts of relationships with the world (Favrholdt, 2009).

The unpredictable quantum leaps

What Bohr, with his innovative thinking, managed to show was that electrons do not move at any distance from the atomic nucleus, as classical physicists had claimed. Instead, he argued that electrons are restricted to moving in stationary orbits at a fixed distance from the atomic nucleus. Each path represents a certain amount of energy. The farther away from the nucleus an electron's orbit is, the higher its energy level is. When the electrons are in their stationary orbits, the atom emits no radiation. But an electron can jump from its current orbit to an orbit with less energy and, thus, release the excess energy in the form of radiation, a so-called quantum leap (Bohr, 2013). Bohr believed that light transmission occurred through a sudden and inexplicable quantum leap. This contributes to the generation of atomic energy.

It is not possible to predict where and when the electron will take such a leap, nor what the quantum finds when it disappears from one place and reappears in another. This quantum is the minimum amount of any physical entity involved in an interaction. It can be present in several places at once. Sometimes, this is carried out by a very small effect of the quantum and, other times, by something much larger. The quantum simply keeps the world going. It just happens, you cannot see it while it is moving (Bohr, 2013). Bohr did not mean that physics has the answer to everything but, instead, that the smallest particles on earth have a lot to tell us. They provide an opportunity for us to understand matter as a part of complex whole. Through greater and greater exploration, according to Bohr, we may discover a larger and larger context. He meant that there could be endless harmony that we can only imagine but never grasp (Bohr, 2013). This is important when trying to think with the world.

Knowledge in an anthropocentric age

The context for contempoary explorations about how we can think with the world is shaped by global challenges, especially in respect of climatic changes and environmental degradation (Staunæs & Krejsler, 2013; Sjögren 2016, Bergstedt, 2017a; Juelskjær, 2020). One of the reasons for this is that Vitruvian man of the Anthropocene (Braidotti, 2013) is central to all knowledge creation based upon dualist divisions between subject and object and between people and matter (Barad 2007, Braidotti 2013, Grusin 2015). To succeed with new knowledge that could better meet the challenges of our time, we need different starting points than those that place humankind at the centre. Therefore, Karen Barad, inspired by Donna Haraway, uses the concept of *natureculture* to show how all phenomena are in constant relationships and change (Haraway 2004, Barad 2007).

There is an ongoing connection between all phenomena. Both culture and nature can and are co-created. They are actors who create a multitude of self-organized structures. Barad argues that matter has an agential potential in itself, which is not always identified and represented by human language (Barad 2007). It promotes the idea that humans are embedded within more than just human networks and therefore are not autonomous agentic forces in the world. There is a world that we are part of, as Bohr also says, and we know very little about this world. What we can do is repeatedly strive to describe phenomena's relations to the world. Here we are dependent on language, but at the same time, there is a world that is more complex than we can describe with language (Bohr 2013). What we can strive for is to develop is a language that can be considered a new way of describing how phenomena come into being with the world.

A constantly ongoing materialisation

As Barad pointed out both humans and non-humans are in interwoven processes where they become part of a future with the world and with everything that emerges as a phenomenon. Barad describes this as *agential realism,* which means that a variety of phenomena are constantly created through interconnections of language (discourses) and materiality. The focus here is on the production of phenomena that are constantly developing. For Barad, agents are neither subjects nor objects, but space is created as an effect of the world in which the phenomenon is located (Juelskjær, 2019).

Barad (2007) means that all bodies, not just the human body, are created from ongoing performativity, constant doings, which, in turn, causes the phenomena to be specific to the circumstances in which they are created, where the circumstances are phenomena from previous *intra-actions*. Barad uses this concept to show that relationships also include non-humans, such as animals and matter. This is unlike the concept of “inter-action” (Barad, 2007) that has helped to define relationships with people. Intra-action is central to agential realism; it is here that “matter-in-the-process-of-becoming” (Barad 2003, p. 23) is created and woven into a further materialisation (Juleskjær, 2019). The matter is both a stabilising and destabilising process of repeated intra-activity. This means that phenomena should be seen as effects of intra-activity, of

constant ongoing links between phenomena. Intra-actions create temporary boundaries, but boundaries are never constant – they are not still – according to Barad (2003).

When stones in water grind against each other, they act together. Similarly, when a stone and an artist act, they connect, and together they produce something special, something that was not there before. The phenomenon maintains its future with the world by connecting, sharing, and spreading with others (Barad, 2007; Bennett, 2010). Matter is constantly in connections of various kinds, and it is in this way that we can talk of becoming with the world. There is always an ongoing intra-action between phenomena. Matter itself and its materialities are self-created. They strive for knowledge, which allows self-organised structures to arise (Latour, 2003; Bennett, 2010). Together, they produce something special, something that did not exist before. Such co-action with the world creates what Barad (2007) calls a *phenomenon*. Matter does not refer to an inherited, fixed entity of independently existing objects, but phenomena in their continuous materialisation; it is not a final product but an ongoing process of materialisation (Barad, 2007).

Barad is careful to point out that the phenomenon does not refer to an inherited, fixed unit of independently existing objects, but rather that these become a phenomenon through their continuous materialisation. The phenomenon is not an end product but matter itself is part of a constantly ongoing materialisation, which will take expression as well as a phenomenon's form and movement (Barad, 2007). Knowledge is therefore not something that is given in advance, but rather something that comes into being when phenomena propagate and move – a future that is based on the phenomenon's relationship with the world. How is this possible? How can the world enable intra-actions? Although Barad's thinking differs from Deleuze's and Guattari's philosophy, connecting them can present new possibilities. Deleuze and Guattari's process ontology offer more possibilities to think with the world.

The world is difference in itself

Deleuze and Guattari (2015) stress the importance of seeing what the world can do; its functions, and its effects. That the world can be and become in itself contributes to an internal principle, an inner *self-differentiation*. The world is a substance that is non-A and A simultaneously. This means that the world is androgynous; it is the difference in itself and the recognition of itself by embracing itself, a substance to which all phenomena that arise must relate in one way or another (Grosz, 2018). This means that the world is neither matter nor body but what makes these two possible. It is a world that does not see itself as it cannot observe itself from the outside. The world cannot reflect. To quote the Danish poet Inger Christensen (2018), "The world is in itself, in the way of being the world (p. 821)" (original: Verden i sig selv, i måden at være verden på).

This is why we can say that the world is a *substance* (Spinoza, 2001, Grosz 2018). It cannot be seized or controlled; it is in itself of a nature that has not yet been affected, but which can be created in a free and unforced way. We cannot observe the world, but we can suppose that the world appears in unexpected places and at unplanned times (Danielsson, 2020), and it will all take

place on a flat surface that does not follow any given order or linear development (Deleuze & Guattari, 2015). This means that the world is repeated in every moment, something that phenomena in one way or another have to relate to.

If we connect this thinking to agential realism, it creates a space of possibility in the process of phenomena becoming (Barad, 2010). We can now see knowledge as an answer that the phenomena give to the world when they become. In this way, we can say that phenomena help the world to see itself. It is this relationship with the world that means knowledge is always in processes of becoming. It may well be that the first phenomena on Planet Earth came into being through the swirls that arose with the repetition of the world. A phenomenon cannot be merged with this repetition, but it will come into being in its becoming. In coming together with and in the world, the phenomenon become agentic. This is done by weaving, connecting, sharing, and transforming with other phenomena.

From Deleuze and Guattari (2015) we can learn that phenomena are at all times on an *immanent* plane. Nothing is hidden; there is no God or anything in advance, given a uniform phenomenon such as nature, man, or consciousness. By contrast, the immanent plane is contained within a world that is recognised by its inherent repeating (Colebrook, 2010). This emerges from what can be perceived as harmonic chaos in the form of an untargeted and constantly repeated world. As part of this harmonic chaos, the world consists of several phenomena. Everything that transpires in the world does so in the form of something visible and empirical, something that can be observed or touched in some way. At the same time, there is something virtual and intangible, something that cannot be captured. It is the world itself that cannot be grasped or held, and which is chaotic in a constantly repeated way (Deleuze & Guattari, 2015).

The constant change in one's own body

Theory then can help us to understand how phenomena are created in relation with the world, but how should this exploration be carried out in practice? To describe what research might look like in practice, we cannot avoid taking a closer look at the abilities and possibilities of the research process. Initially, it must be a knowledge process that actively creates intra-action in the situations in which it is included. It is therefore important to design the device in a way that prevents a researcher from repositioning him or herself in the centre of the world. Thus, the body is most important. A body has no limits on where it starts or ends. This is because our bodies are made up of other living organisms that we would never be able to do without. The constant change in one's own body prevents us from focusing solely on what can be mirrored and enables discoveries as a world outside ourselves (Haraway, 1991, 2004, 2016).

The philosopher Henri Bergson (1979) said: "There are not two identical moments in a conscious being" (p. 164). There is always the question of movement and of being subject to this ongoing change. The singularities are then thought of as intensities where something is specifically concentrated, separated/differentiated, as a direction within and outside of man. Becoming, then,

is the movement that arises in the direction of what the subject is not at the moment, but of what it is heading towards and of what it has the opportunity to become (St. Pierre, 2013). This process of making us insignificant is described by Deleuze and Guattari (2015, p. 351) in terms of *becoming imperceptible*. Which is about being able to exercise the ability to move from a familiar vantage point to the unknown and then back, but now with new conditions and in a new direction.

Haptic sensorium and bodily affects

How might we study the phenomena's relations with the world? Inspired by educational researcher Malou Juelskjær (2020), we have chosen to call parts of the knowledge process a *sensorium*. To this, we have linked the concept of *haptic*, which makes the concept of *haptic sensorium*. The term sensorium comes from Latin's "census" and describes the place in the brain that perceives changing sensory impressions, which include sensation, perception, and the interpretation of experiences, both in the body and with other phenomena (Juelskjær, 2020). Haptic means that the body is focused on being touched by something unexpected. Barad (2012) uses the term "touch" and says that when we touch we are already in touch with the world. Touching and being touched are constantly going on, performed with the help of the mind and body. We are already in the world, which is constantly being repeated. It is when we touch and are touched by phenomena that we can discover how the world also contributes to our and others' futures (Barad, 2012; Bennett, 2010).

The haptic sensorium helps us to perceive and become part of the diversity that each body is part of. There is no specific boundary between the body and what is outside or inside it. The body becomes and is made active by the eyes, ears, skin, sex, and stomach, and it touches the connections that are created with other phenomena. The haptic sensorium makes it particularly possible to emphasise bodily *affects*. The term affect comes from philosopher Baruch Spinoza (2001) and refers to the fact that we do not know what the body should do. The body is always more than the knowledge we have about it, which makes the consciousness incapable of registering anything but effects of affects.

Affect is what is experienced before something is thought. What we commonly call emotion in everyday speech is a conscious experience of some affect or a combination of effects. Affect is thus an influence on the body before it is given a subjective or emotional meaning. Emotion comes later as a classification or stratification of affect (Otterstad, 2018). Philosopher Brian Massumi believes that affect should be understood as something conscious, pre-individual (Massumi, 2002). Affect is something that comes before thought and, therefore, also affects the body before it is given a subjective or emotional meaning – an addition, something that is "more" and that therefore also requires a special form of design to be able to convey it linguistically. Therefore, it is important to pay attention to the affects of the body with the body (Massumi, 2002; Haraway, 2004; Staunæs & Kofoed, 2015). In this way, the haptic sensorium helps us to study how phenomena becoming with the world. It helps us to spread out, open, join, and expand phenomena so that they can come together and connect in new and different ways.

Limit values help us to think with the word

This is a case, as philosopher Michel Serres points out, of being a little ahead of the language, between noise and music, with the world contributing to the phenomena. Similar to Deleuze and Guattari, Serres sees the world as something in itself, something that can be considered to be "objective" in the midst of what appears and what can be observed (Serres 1998 p. 42), There is always something more that breaks into our way of becoming: a form of transcendental objectivity at the immanent plane that enables man to function in the same way as all other phenomena and that, together with them, forms part of the large complex communication systems that emerge as the worlds in which we live (Serres, 1993, 1997, 1998, 2007; Lyngsø, 1994).

Serres is a philosopher who strives to think of this diversity as not being preceded by any kind of unity. It is a question of diversity without definition or boundaries – an undefinable and non-integrating diversity. In this way, Serres' diversity is given an ontological status. It is the question of a spectrum of diversity that like chaos spreads in a way that makes it impossible to calculate or organise phenomena in a predetermined order. The only things that can be determined and conceptualised for certain are those that are at the limit of this diversity, which Serres calls *limit values* (Lyngsø, 1994; Serres, 1998). A limit value is on the border of the world that cannot be grasped. These limit values can help us to take a step further to analyse what happens when phenomena is becoming with the world.

"We hear without boundaries"

A limit value to the world can be, for example, a background noise, a noisy noise, chaos, in French "le noice" (Lyngsø, 1994, p. 158), or hearing what is being shouted at a football game or a concert. The secret lies in this alarm and noise. This chaotic sound is as primitive as the stormy winds of violence that have been released. The noise is a parasite, Serres says, and it follows parasites' logic. It passes and dies away without changing anything (Serres, 1998). Therefore, background noise in itself has no basis and cannot be attributed to any identity but lies behind and under everything else. Background noise is a limit value that can make us detect the world. Nowhere can we hear the background noise as clearly as at sea, writes Serres (1998), who himself was once a sailor. Here all possibilities are realized at once. Another possibility for discovering limit values to the world is what Serres calls "the white", in French "le blance" (Lyngsø, 1994, p. 158). The white metaphorically described as pure virtual reality, the joker, a white domino tag, the one that can take all possible values – a coin that itself is of no value but that can be converted into anything, for bread, books, tickets, etc.

"Le blance" is the mathematical variable *x*, the indefinite one, and that which is an empty place, the yet-not-for – the place where no possibilities have yet been realised. It is a place that cannot be seized but which allows for connections and divisions of phenomena of various kinds. Similar to background noise, this joker is a limit value that can make us detect the world. For Serres (1998) it is about exercising an ability to understand without a concept, to perceive "le blance" and "le

noice" as to limit values that cannot be defined. They are created towards and with the world, which makes it possible to gain insight into the world even though it is undefined. Although we can never fully describe the world, its limit values can be described using never-exhaustive examples.

The device enables us to exercise an ability to pay attention to how the phenomena are created and how they move, connect, share, transform, and intertwine. The important thing is to train all the senses, like a haptic sensorium, and here Serres (1998) thinks that listening is especially important; "we hear without boundaries", he says (p. 42). Sound is better than sight for perceiving diversity and complexity. The eye separates and divides while the ear receives and is touched by a noise from the phenomenon's speech. Music and sounds touch and flow through the body in a way that makes it easier to detect and follow limit values. We, therefore, strive to be a little ahead of language, between noise and music (Serres, 1998).

There is no direction in the self-repetition of the world; this is everywhere and constant. It can be perceived as a chaos of phenomena but also as a constantly recurring beginning – a start, "le blance" that allows for the complexity of both formation and mobility. The phenomenon has to be able to cope with this to become an ongoing variable, or what Barad (2007) calls "spacetimemattering" (p. 234). Here, time and space are not some linear or delimited processes but, on the contrary, things that are created unpredictably. What makes these discoveries possible are the limit values, as affects that appear in and through the body. It is with these limit values that we can understand what happens when phenomena becoming with the world.

Rhizome: Start in the middle

An important element in every research process is the design of the knowledge that is created. One challenge we now face is how an ongoing complexity of phenomena forms and mobility can be depicted? Such a design is not possible if we use a customary scientific language that, with its dualism, puts humanity at the centre. The article began with Barad's concept *wor(l)ding* (Barad, 2007) that pointed to how language and the world connect. Similarly, Bohr sought a language that could describe the phenomenon's relationship to the world and according to Serres, we have to turn to everyday language, which is why he uses a "poetic style" when exploring phenomena's becoming with the world (Lyngsø, 1994). An everyday poetic language is not as tied to the phenomena as a scientific one, and it can move more freely and therefore it also has more opportunities to follow changing ones.

In addition to using a poetic style, it can be fruitful to turn to cartography with inspiration from Deleuze and Guattari (2015). A common way of seeing a map is as a representation that places a grid around the world, forcing what is alive, complex, and changeable into a form. Unlike the map, cartography has no beginning or end, but all points can serve as a starting point; it is just about working out how to orient oneself based on it. Mapping here is based on an ontological assumption that the world is always produced when knowledge is created with it.

The form of cartography that Deleuze and Guattari (2015) particularly emphasise is called *rhizome* – a figuration that draws attention to a flow that moves in many different directions and thus also to unlimited growth. Rhizomatic writing is characterised by mobility; it strives for heterogeneity and does not seek basic unity. Unlike the tree as a metaphor, the rhizome has no lifeblood, roots, or synchronous growth. A new rhizome can be formed in the middle of a tree or as a fold on a branch. This openness means that the rhizome is surrounded by uncertainty because it necessarily contains aspects that at least for a moment are impossible to imagine. By using a quote from the anthropologist Carlo Castaneda, Deleuze and Guattari (2015) give an example of how we can work with a rhizome:

> Go first to your old plant and see carefully which sheep the rain has caused. By this, the rain must have carried the seeds far away. Pay attention to the runnels that run from there, so you can determine which direction the flow has taken. Then look right at the plant that has grown far away from your own. All the plants in between are yours. Later, when they go into seed, you can expand your territory by following the water flow from each plant in the area (p. 29).

Just as a nomadic tribe spreads out over territory without dividing it among the individuals, where each member takes what he or she can and encounters a boundary only when it is impossible to spread out further, splitting and spreading provide the opportunity to discover what the phenomenon is like (Deleuze & Guattari, 2015). Such an approach to phenomena of various kinds exercises an ability to notice shapes as well as movements and transformations, to stretch lines that can become escape lines, which show breaks when they are pulled out and extended in all possible directions.
When you want to follow a phenomenon in a rhizome, it can be good to start in the middle. What's special about this? It is an opportunity to start with limit values, what Serres (1998) calls "le blance". A limit value to the world that enables the complexity of phenomena both us formation and mobility. A centre is a place where no opportunities have yet been reached. It is a place that cannot be grasped but that enables connections and divisions of phenomena of various kinds. Starting in the middle of a phenomenon it is possible to discover how the world's repeating constantly contributes to a phenomenon. It is from the middle that every phenomenon once became and that is where a phenomenon's future can now be followed. Watch, listen, feel, be present, and draw lines for the movements that can be perceived for phenomena in the situations being explored (Ingold, 2011).

Slowly, repetition and folding have filtered out so that phenomena, through interconnections with other phenomena, have set themselves in motion and created forms and forces and energies. Therefore, if we want to discover phenomena's relationships with the world, we can search for the middle so that we can observe how phenomena are created with other phenomena: the place where no possibilities have yet been realised but from which it is possible to develop the

phenomenon of “plier le monde” (Deleuze & Guattari, 2015) in English “Fold the world”.

From the middle, phenomena move like lines and threads in a landscape, with roads and paths, without any of them having a predetermined direction. An added value causes the phenomenon to constantly move, sometimes with a quick movement, sometimes slow, sometimes forward and sometimes backward, one phenomenon to another and vice versa, which means that there is no linear structure that can be followed. There are no fixed points or positions here, but there are lines that go in different directions. These lines carry unexpected and unplanned affects. Notice and pay attention to what happens at these limit values to the world – the unexpected, the surprising, the unplanned. Affects that break out without us planning them create a situation’s intensity and potential for change. Affects cause the phenomenon to respond to the world by creating meaning and knowledge. When and how do they occur, and in what way will they change the phenomenon’s continued becoming? Which direction do the lines take after these events? How is the phenomenon transformed? Do they move on, or are they closed around themselves?

These lines and threads help us to visualise the forces that make this a branched network. Stories of lines, root threads, plateaus, and folds develop. The cartographic rhizomes, as Deleuze and Guattari (2015) suggest, are open and connectable in all types of dimensions; they are removable, reversible, and susceptible to constant modification. By combining formation and movement with affects, rhizomes enable a further shaping of how phenomena are created with and in the world. The rhizome becomes a multitude of connecting lines that touch each other on several levels and in different directions (Otterstad, 2018; St. Pierre, 2013).

Conclusion: to think with the world

This article has grappled with questions: How is it possible to think with the world? How can thinking with the world gives us knowledge about the becoming of phenomena? to arrive at a conclusion that it will be possible to re-think and create new knowledge about phenomena’s becoming by learning to think with the world through our research practices. The world should therefore be seen as the most important partner in every phenomenon. It is the world that we all constantly come into being with, it is the one that evokes an infinite number of phenomena.

Therefore, it is also our ethical responsibility how we come to be with the world that enables our living conditions. Each action will in one way or another affect both ourselves and the phenomena we associate with. Our language, our stories and our knowledge will have an impact on what happens. This way of thinking gives us a new vision of how phenomena becoming with the world. If we put man in the centre of the world, it is difficult for us to see this. Therefore, we have to connect with the world in a new way to see how this can expand our understanding of what happens when phenomena are created. Barad has shown us that phenomena always connect in one way or another to be able to format themselves and to be in movement, and this creates diversity in formation and mobility. From Bohr’s quantum physics, we have learned that quantum can take a leap that cannot be predicted. The atom has formed itself in a way that uses a limited

value to the world; instead of controlling and trying to predetermine when a connection should take place, it allows the phenomena to participate by enabling a connection where there is openness and an opportunity for it to happen. It is this complexity to become that we can learn to explore if we try to think with the world. What this article has shown is that we are in the middle of the world that is repeating itself through internal self-differentiation. A world that cannot observe itself from the outside or reflect, but to which all phenomena that strive to come into being must relate to this in one way or another.

In educational research, there has been an interest in relationships for a long time. What was originally a relationship between teacher and student has over time expanded to relationships with and in language and matter (Bergstedt & Herbert 2017b). This means that educational research is provides new insights into how knowledge is created (St. Pierre 2013). Thinking with the world can broaden understandings of how we learn and what it is that makes us create knowledge.

When educational researchers want to research with the world, it would help to develop a haptic sensorium that can widen our senses and make us susceptible to affect. With this haptic sensorium, we can follow phenomena in their becoming through formations, movements, and connections. In this process, we also can place a special focus on limit values to the world. This can teach us that our bodies always are more than just human (Alaimo, 2010). The boundary between the body and its surroundings is unclear. The haptic sensorium assumes that matter has agents, which take place through connections between phenomena. This contributes for example to the creation of sounds and vibrations of various kinds. In the performance series *Sound of Mull*, Ann Rawlings (2019) describes how she listens to "deep time" and which stretches along the geographical time axis when the earth is created when mountains and deep seas have been formed. By exploring the sound of a beach with its sand, rocks, shells, water, and plants, new insights can arise about how matter and bodies connect with the world.

When creating these knowledges, we can use the figuration of a rhizome which provides an illustration of the complexity that characterises the emergence of phenomena. It will also help to create new questions and new concepts which will ultimately assist in developing knowledge for how phenomena are becoming with the world.

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