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Gendering an Bildungseinrichtungen : Agential Cuts in Lehre und Forschung

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New Perspectives in Gender Research

Working Paper Series 2021, Volume 2

Hannes Leuschner
Imme Petersen

Gendering at Educational Institutions

Agential Cuts in Education and Research

With a Commentary by Carol A. Taylor

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Gendering at Educational Institutions

Agential Cuts in Teaching and Research

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Abstract

According to Karen Barad's notion of agential realism (*Meeting the Universe Halfway*, 2007), students, teachers, but also educational objects and spaces do not have primary qualities but are the result of changeable relations. Barad further describes the possibility of performing an *agential cut* within such an intra-active configuration, that is, the more or less conscious establishment of a subject-object relation from which a reconfiguration of the actual relations at any given time can take place. In our paper, we will use the concept of agential cut to explore Barad's theoretical framework and discuss what happens during ethnographic research between analytical approach, empirical data, and the researcher in the field. Our considerations are based on ethnographic research carried out in three educational institutions in Germany: elementary school, comprehensive school, and university. Our study draws on ethnographic studies focusing on gender at school. Within this field, our approach is to understand our own research practice with Barad's concept of the agential cut, which is discussed in many different research fields. Therein, we are not primarily concerned with questions related to *Teaching with Feminist Materialisms* (Hinton and Treusch 2015), but with questions about *researching teaching* with new material feminism; in particular, we want to offer an extended reading of Barad's concept of agential cuts in order to make it applicable to the researcher and their research subject, as well as to the ethical relationship between them.

Keywords
Karen Barad; new material feminism; agential cut; quantum physics; research methodology.

Zusammenfassung

Karen Barad's Konzept des Agential Realism (*Meeting the Universe Halfway*, 2007) postuliert, dass Studierende, Schüler_innen und Lehrkräfte wie auch edukative Räume und Objekte nicht essentialistisch bestimmbar, sondern Produkte veränderbarer Relationen sind. Barad beschreibt die Möglichkeit, einen agentiellen Schnitt (*agential cut*) innerhalb solcher intra-aktiver Konfigurationen vorzunehmen. Dies bedeutet die mehr oder weniger bewusste Setzung einer Subjekt-Objekt-Relation, durch die jederzeit eine Rekonfigurierung der aktuellen Relationen erfolgen kann. In unserem Beitrag nutzen wir dieses Konzept des agential cut, um die baradsche Theorie darauf hin zu diskutieren, wie während einer ethnographischen Feldforschung analytischer Ansatz, empirische Daten und die Forscher_innen

im Feld interagieren. Unsere Überlegungen basieren auf ethnographischer Forschung, die wir in drei unterschiedlichen deutschen Bildungsinstitutionen durchgeführt haben: Grundschule, Gesamtschule und Universität. Unsere Forschungen schließen an erziehungswissenschaftliche Geschlechterstudien im schulischen Kontext an. Innerhalb dieses Feldes analysieren wir unsere eigene Forschungspraxis mit Barads Konzept des agential cut, dessen Potential derzeit für verschiedene Forschungsbereiche diskutiert wird. Dabei liegt unser Fokus nicht auf dem Potential (neo-)materialistischer feministischer Ansätze für die Lehre (*Teaching with Feminist Materialism*, Hinton and Treusch 2015), sondern auf der Untersuchung bestehender Lehre aus (neo)materialistischer feministischer Perspektive. Dabei geht es uns insbesondere um ein erweitertes Verständnis des agential cut, um dieses Konzept auf Forscher_in und Forschungsgegenstand sowie deren ethischen Beziehung zueinander anwendbar zu machen.

Schlagworte

Karen Barad; neuer feministischer Materialismus; agentieller Schnitt; Quantenphysik; Forschungsmethoden.

Introduction

In the present paper, ethnographic vignettes from our fieldwork are starting points to discussing Karen Barad's influential concept of agential cuts. The ethnographic episodes presented describe powerful material-discursive practices of configuring or reconfiguring gender in educational institutions. We will use these ethnographic vignettes to explore Barad's theoretical framework of agential cuts, and to discuss what happens during ethnographic research between analytical approach, empirical data, and the researcher in the field.

Our research was carried out in three educational institutions that are typical of the German educational system: elementary school, comprehensive school and university. This multi-sited context enables us to compare the complex entanglement not only of things and bodies, gender and authority at educational institutions, but of the researchers and their own research practice as well. Our research contributes to a series of ethnographic studies focusing on gender at school (for example Massey 2005; Günther-Hanssen, Danielsson and Andersson 2019; Lyttleton-Smith 2017; Hohti 2016). Our fieldwork was guided by Barad's concept of agential realism, which forms part of new material feminist and posthuman performativity approaches, as discussed in diverse disciplines (for example Alaimo and Hekman 2008; Coole and Frost 2010). Thereby, we are not primarily concerned with questions related to teaching with feminist materialisms (for example Taylor and Ligozat 2019; Hinton and Treusch 2015), but with questions about what Barad's agential realism means for the research process in educational institutions (Taylor and Ivinson 2019).

Amongst other material feminist scholars (for example Taguchi and Palmer 2013; Gannon 2016; Højgaard 2012; Mazzei 2013), the work of Carol A. Taylor has been a previous source of inspiration to us. We completely agree with her emphasis on a diffractive methodology, as introduced by Donna Haraway and included into Barad's agential realism. Haraway introduced the term 'diffraction' as an alternative concept to 'reflection' into humanities. Accordingly, scientific work is about composing 'interference patterns' and not 'reflecting images' (Haraway 1992: 299). Haraway denies the claim of detecting representational knowledge as an arrogant "god trick" (Haraway 1988: 581) and points to the "situatedness" of any knowledge and any knowledge production. For Karen Barad, "a diffractive methodology is a critical practice for making a difference in the world. It is a commitment to understanding which differences matter, how they matter, and for whom" (Barad 2007: 90).

In the following sections, we will not present Barad's new material feminist and posthuman

performative framework in detail. But we will introduce some of her concepts that are important for our reflections on the meaning of what Barad calls agential cuts for our research in educational institutions. Then, we will put forward ethnographic examples of ordering and organizing, that is, configuring or reconfiguring, gender in different educational settings. Discussing and comparing our fieldwork in school and university culture with Baradian terms will lead us to discussing our research process and reflecting on ourselves as agents of academic culture. Hence, we focus on researching our own research practice by questioning the agential cuts we have carried out while claiming to detect cuts during ethnographic observation. Discussing the application of the Baradian concept of cuts by Carol A. Taylor (2013), we aim at developing a broader concept of cuts that includes the researchers as part of the ethnographic observation and their academic apparatus. This will lead us to the question: How does the nature of the agential cuts carried out by the researchers (observers) or by the agents configuring gender in educational institutions (observed ones) differ?

1. Barad's Agential Realism

With her concept of agential realism, Barad wants to propose an epistemological, ontological and ethical framework at the same time. Its designated aim is to overcome, not only the common categoric discriminations of human and nonhuman, material and discursive, as well as natural and cultural, but also to overcome theoretical dichotomies between constructivism and realism, such as approaches focusing on agency versus structure and quarrels between idealist and materialist stances (Barad 2007: 26).
The basis of Barad's holistic concept is an understanding of any phenomena as ontologically primitive relations without pre-existing relata. According to Barad (2007: 33), observable phenomena in the world emerge from "agentially intra-acting components". Subsequently, she suggests replacing the term *interaction* with the neologism *intra-action*: "It is through specific agential intra-actions that the boundaries and properties of the components of phenomena become determinate and that particular concepts (which are particular material articulations of the world) become meaningful. Intra-actions include the larger material arrangement (which is a set of material practices) that effects an agential cut between *subject* and *object* (in contrast to the more familiar Cartesian cut which takes this distinction for granted)" (Barad 2007: 139-40). An agential cut, in Barad's understanding, is not a principle, but a temporal separation within a phenomenon that enables scientific acts such as measuring, observing, and describing. Cuts are performed not only by single agents (be they human or not), but they are effected by intra-active (strongly entangled) larger material arrangements which she calls 'apparatuses' (see the next section).

In order to reconceptualize the nature of scientific practice and its relationship to ethics, Barad resorts to important insights from quantum physics that revolutionized the discipline in the beginning of the 20th century, in particular the double-slit experiments carried out with quantum objects. The experiments that substantiate quantum theory are simple in principle – but not in the physical reality. For a long time, therefore, they had solely been performed as *thought experiments* (theoretical research), until physicists were able to perform them physically. The results of this experiments showed, that quantum objects can behave both like waves or like particles, and that it depends on the scientist's expectation how they behave in a certain experimental setup (apparatus) that can be understood as a materialization of their epistemic interest.

German Physicist Werner Heisenberg explained such findings as a principal problem of artefact in measuring called the *uncertainty principle*. The Danish physicist Niels Bohr understood the *uncertainty principle* not as an explanation for artefacts, but as an ontological fact that points to an inseparable entanglement of being and knowing, matter and the discourse about it. This interpretation was physically tested by an

extended experiment called *Quantum Eraser* in the 1990s. In this experiment, it was possible to change its results even after the experience had been conducted. This substantiates Bohr's theory about the fundamental entanglement of observer and observed: There is no object before it is measured, and what emerges as data as a result of the measurement depends on what you want to know. Apparatuses do not merely measure something; they produce phenomena by measuring them[1].

1.1. Barad's concepts of apparatuses and cuts

Apparatuses, in Barad's understanding, "are not mere observing instruments but boundary-drawing practices – specific material (re)configurations of the world – which come to matter" (Barad 2007: 206). By thinking of discourse and matter, not in a representational, but in an entangled relation with one another, the temporally implemented distinction between observer and observed does not only apply to experiments in the context of natural science but in an even more obvious sense accounts for the apparatus of any research in socio-cultural fields as well, where the apparatus consists of various theories, concepts, discussions about them and the material world they are embedded in. Barad further states that "apparatuses have no intrinsic boundaries but are open-ended practices" (2007: 146), pointing out something that researchers in the humanities quickly learn by both enjoying and suffering from it: that research into the complex entanglement of any social field always grows and never ends. There is always something more, every question is ultimately an open one, and it is the researchers' boundary-drawing by attributing meaning, their response to, and thereby responsibility for, the field that determines what they call and eventually present or publish as 'results'. The consideration of something as meaningful, the decision to focus on something and not on something else, common to all research processes, can be described as a series of agential cuts performed by the researcher as part of an academic apparatus of research implementing an "exteriority-within-phenomena" (Barad 2007: 140) which we shall explain subsequently.

In Barad's terms, we as researchers can make our agential cuts by analyzing a scene, but we are not escaping the world by doing so. We merely initiate a new turn of mutual intra-active constitution, through which we may participate in a struggle of sometimes opposing cuts while participating and analyzing at the same time. The question we want to pursue in the following sections is: Is there anything special about calling our apparatus an academic one and contrasting our cuts to 'other' cuts made in the realm of 'other' apparatuses?

Following Barad's posthuman performative line of thinking, what is understood as agents in an intra-active approach – be they teachers, researchers, or students, be they stones, tables, or electric panels – are intra-active parts of apparatuses: let's say 'intra-agents' as part of larger material-discursive practices rather than as independent agents external to the phenomena. Now, an obvious methodological problem is that the concept of cut can easily become inflationary: everything, any step taken, any word spoken, any look given can be understood as a cut that configures or reconfigures the world by implementing a temporary subject-object relation. This relation enables an intra-action whose consequence is a transformed intra-active state, which immediately effects new cuts. By saying "Hello!" to you, I take you out of our relationship and turn you into the object of my greeting. And we are entangled, if not since ever, then from now on. This constantly happens, as Barad herself points out:

"In summary, the universe is agential intra-activity in its becoming. The primary ontological units are not 'things' but phenomena—dynamic topological reconfigurings/entanglements/relationalities/(re)articulations. And the primary semantic units are not 'words' but ma-

1 To find out more about quantum physics in general, see Barad (2007), regarding the quantum eraser experiment see Barad (2010). For a non-material feminist introduction to quantum physics see Hey and Walters (1987).

terial-discursive practices through which boundaries are constituted. This dynamism is agency. Agency is not an attribute but the ongoing reconfigurings of the world" (Barad 2003: 818).

This seems to us a convincing description of the world in general, fitting with quantum physics as well as with everyday experience – but what to do with it as a social scientist? We, as part of an academic apparatus, aim at giving meaning to parts of this contingency as do others who are part of an ecclesiastical apparatus or a school education apparatus. So, from now on, we are not going to discuss the micro-cuts enabling daily interaction, but cuts as a methodological function of what Barad calls apparatus. Relevant cuts happen through apparatuses and produce "differences that matter" (Barad 2007: 382). We install apparatuses within and as part of a finally cosmic intra-action. From a cosmic point of view, such apparatuses are probably irrelevant: What do the moon and the stars care about our researching and experimenting on earth? Still, in society, apparatuses and the cuts enacted by them are powerful conjunctions configuring more or less extended parts of intra-actively shared reality. This reconfiguring of the world can be seen as a matter of power producing differences that matter. At the same time, reconfiguring can be understood as a matter of dialectics when it is responding to a situation and taking responsibility for it. In the possibility of responding to a situation in different ways, matters of ethics begin. But before returning to the question of ethics later, we want to look at how Carol A. Taylor applied the Baradian concept of cuts and apparatuses to her empirical research, carried out, just like our own, in educational institutions.

1.2. Taylor's methodological application of cuts

Taylor carried out her research in a college classroom in the UK, participating in a sociology course taught by a teacher she calls Malky. In her illuminating paper, she describes her agential cuts while observing the class as an analytical practice:

"[...] a diffractive methodology is most persistent in calling us to account in new ways for the choices we make by including these data and these incidents and not others. I follow this line of thinking through in relation to Barad's (2007) concept of the agential cut, an analytic practice which both separates out 'something' – an object, practice, person – for analysis from the ongoing flow of spacetimemattering, but which, at the same time as separating and excluding, entangles us ontologically with/in and as the phenomena produced by the cut we make" (Taylor 2013: 691).

By responding to an intra-active situation, by drawing borders and giving them meaning, the researcher becomes responsible for and thereby entangled with the observed situation: Cuts, in Barad's understanding, do not only separate 'things', but put them together at the same time (Barad 2007: 179). Taylor's analysis of Malky provokes an entanglement with him, in which she as researcher is not clearly separable from him as research subject. As Taylor does her cuts, Malky does his cuts:

"I'm getting more of a feel for Malky and how he conducts his lessons…He is leaning back in his chair and controlling the space at a distance. He decides who should talk and when they should talk. He's like a radiating star…everything comes from him and goes back to him. When the students discuss things in pairs this is set off by Malky and he controls how long they talk to each other. Other than that the whole focus of the class is on Malky" (Taylor 2013: 692).

While observing Malky, Taylor recognizes how intra-active materializations of Malky's masculine self-confidence "[…] produce boundaries between his chair-body physical ease and their immobile attention, his voice and their [the students'] silence, his wit and their receptivity to his humor, his knowledge and their lack. This is why Malky's (and all teachers') intra-active cuts count: they enact 'differentness' (Barad 2007: 137), maintain hierarchies and instantiate gendered power. Of course, boundary-making practices are endemic in teaching contexts" (Taylor 2013: 694).

Even though Taylor's results, presenting agential cuts as a diffractive methodology are

conclusive to us, we think that the question of how to use the Baradian concept of cuts in ethnographic research has not been sufficiently answered yet. It seems that Taylor and Malky are doing just the same: they set boundaries, give them meaning, and by doing so, they configure or reconfigure the world. Maybe due to our professional training as cultural anthropologists, we are very suspicious of any processes of othering in a normative way. This leads us to ask: What distinguishes Malky's cut from Taylor's, a teacher's cut from a researcher's cut? Does it make sense, as Taylor does, to speak in a more general sense of intra-active cuts on the one hand and of agential cuts on the other? What exact kind of cut or meta-cuts are agential cuts? Finally, what characterizes an agential cut methodologically?

2. Agential cuts when researching gender in educational institutions

To elaborate on the concept of the researcher's (agential) cut, we aim at presenting our attempts to work with the concept of cuts in ethnography. Our considerations are based on ethnographic research in three educational institutions that are typical of the German educational system: elementary school, comprehensive school, and university (department of mechanical engineering). The research was carried out in each case for several months during 2017-2019 as part of the interdisciplinary research project *Materiality of Gender and Pedagogical Authority – Interferences of Bodies and Things in Educational Institutions*.

Research at the primary school was conducted by Hannes Leuschner, a social anthropologist who has done extended ethnographic research in the field of religions. He studied three different elementary schools; one public and two private ones, based on the pedagogic concepts of Rudolf Steiner (Waldorf school) and Maria Montessori respectively. At the public school and the Montessori school, according to a strong trend of feminization of elementary education in Germany (see, for example, Hastedt and Lange 2012), the teachers were almost exclusively female; the gender ratio of staff at the Waldorf school was balanced. The class sizes of the public school were about 20 to 25 students, the sizes of the Waldorf and Montessori school classes through grades one to four were up to 35 students.

Research at the comprehensive school was conducted by Katharina Bock, a sociologist who is specialized in ethnographic education research. The school promotes inclusion and the collective learning experiences of students from different backgrounds. The concept of inclusion used focuses primarily on physical and motor disabilities. The classes of grades seven to eleven visited had about 30 students; the gender ratio of the students as well as the teachers was balanced.

Imme Petersen, who researched at the universities, is a social anthropologist with expertise in science and technology studies. At the university of applied sciences, Imme Petersen observed classes and lectures in the B.A. study program of mechanical engineering. Men were disproportionately represented, both among students and faculty members. Class size differed according to the semester of study and the form of the lecture. In laboratory exercises, usually no more than 20 students participated, but in a compulsory lecture, there were about 60 students in the room.

During our fieldwork, we all used ethnographic methods, such as participatory observation and interviews. However, the chosen diffractive approach calls for focusing on material-discursive enactments (Taylor 2017: 4; see also Taylor and Nikki 2020). In the field, we translated the diffractive intention by setting different foci during the observations. The foci were mainly on things of educational use, places and spaces of education, and the entanglement between those materialities and the negotiation of gender and pedagogical authority. In each educational institution, we participated in different classes and lectures for pupils and students at various age levels, instructed by different teachers and lecturers, both women and men.

2.1. First ethnographic vignette: "We always do girl and boy!"

Location: Waldorf-school
Date: 02.11.2017
Researcher: Hannes Leuschner

We are in a year one class. The small benches where the children can either sit or work on are arranged in a circle on a large white carpet. The teacher, a woman in her thirties whom I'll call Ms Fricke[2], is part of the circle. I, the social anthropologist, am sitting on a pupil's bench near the door, outside the circle. Giving the children some time in the morning to talk about recent events in their lives is a routine common to many primary schools, and normally most of the children are eager to contribute something. As soon as Ms Fricke takes the semi-precious gemstone, which grants the right to speak, the children are getting agitated. They raise their hands as high as possible, some making sounds such as 'eh, eh!' to draw attention and some get their bottoms up off the benches. Ms Fricke says: "I'll give the stone to a boy who sits properly." To sit properly appears to mean to keep one's bottom on the bench, hold one's spine upright and raise one's hand moderately without making sounds. Ms Fricke gives the stone to a boy who acceptably fulfils these criteria. He tells his little story and looks around the circle, probably calculating where best to convert the symbolic capital held in his hand into social capital. This creates a short break, and Ms Fricke takes a turn. She looks at me with a smile and says to the children and me at the same time: "We always do girl and boy, Mister Leuschner, we consider both genders!" I return her smile and make a quiet sound of polite consent. I have informed her before that our study focusses on the entanglement of materiality, gender, and things, and she seems to be aware of performing a practice where these three elements fuse. The boy passes the stone to a girl, the girl passes the stone to a boy. After telling his story, this boy takes his time to pass the stone: He seems very relaxed while his fellow pupils, regardless of their gender, are getting agitated again. Ms Fricke restricts the choice: "A girl, please!" The boys put their arms down and the girls strive for attention even more. "I only want the proper girls!" Ms Fricke says in a slightly raised voice.

This scene is a clear example of how pedagogical authority takes decisions, although, in grammatical terms, it is not clear to whom this authority refers by saying "we": We teachers at this school? We as a class, including Ms Fricke and the children? I'm quite sure that the second option is not true and many of the children would have preferred to pass the stone to their best friend, be they female, male, or whatever, rather than being restricted in their choice by the teacher's gendering. In Barad's vocabulary, one can describe the teacher's regulations as a series of cuts: By performing these cuts, the teacher sets boundaries and gives them meaning, and by making gender the primary criterion, a binary gender order is passed on as something affectively highly meaningful to the children – it is about the right to speak or the order to keep silent. Ms Fricke's producing of a gendered order is benevolent and in accordance with her idea of gender justice. However, it also perpetuates a binary gender order which excludes gender identities in between or beyond. In a similar situation, a boy was still raising his arm when it was the girls' turn. A schoolmate asked him quite aggressively: "Are you a girl?" So, he learns: in the micro-society of the classroom, you are either a boy or a girl, and getting involved in the girls' turn as a boy will be sanctioned by public reprimand.

2.2. Second ethnographic vignette: "Boys?!"

Location: Comprehensive school
Date: 03.08.2017
Researcher: Katharina Bock

This example of fieldwork was observed on the first school year's day at a comprehensive

[2] All names have been anonymized.

school. Most of the students have been attending this school since primary school age, and therefore most of them know one another, and many of the teachers, very well. However, every year, new students also transfer to this school to do their A levels. The following situation takes place in one of the newly-composed 11th-grade classes. The teacher, Claudia, has already introduced herself and welcomed the class. Then, Claudia asks the class to show the eight new students around the building while focusing on the most important spots. […] After that, a male student, I name him Daniel, places his hands on the edge of a table in front of him, gets up from his chair, and addresses the new male students: "Boys?!". Immediately, all other students, male and female, get up from their chairs. And, without comment, the class splits up into two separate gender groups, and each group sets out for an individual tour through the school building. No one except me seems irritated. What is happening here? How is gender ordered and organized in this educational setting?

The teacher asks the class to show the new students around. Details of how this tour should be realized are left to the class. Daniel takes charge by deciding to exclusively show around the new male students. He makes that clear by explicitly addressing them: "Boys?!" Indirectly he also addresses the girls by excluding them. And that makes clear: Daniel is not seeking for a collective, mixed-gender tour through the school building. Daniel's action sort of forces the class to divide into two gendered groups. The class follows Daniel's instructions, and in that way the class acknowledges his authority. Additionally, by letting Daniel do as he likes and by accepting the ramifications of his action without any reservation, the teacher likewise acknowledges his authority. Instead of teaching her students gender sensitivity, the teacher allows a powerful masculine gender cut to happen.

2.3. Third ethnographic vignette: "Once again you are lightweights."

Location: University of applied science
Date: 07.11.2017
Researcher: Imme Petersen

In laboratory tutorials at a university of applied science, the composition of students' groups performing experiments together is generally up to the students; the group's size is the only given criterion. This morning, I observe a laboratory tutorial in electronic engineering. Two students are sitting together in front of a computer and a modular kit of electric connections. Most teams consist of two men, but two duos are mixed-gender. As a team, the students have to solve a series of problems presented by a software program, and their results are evaluated together. I decide my first agential cut and focus on the mixed teams. One of them is composed of Max and Anna.

Anna starts to plug connections into the electric panel and Max sits in front of the computer. The neighbor, Fred, moves his chair closer to Max, observing what is going on. Max says to Anna: "Whoa, you took quite pretty colors", and Anna answers him with a teasing voice: "Yes, I know!". She starts measuring, while he comments on her action immediately: "Zero Volt is expected, measure over there" pointing with his forefinger at a connection on the electric panel. Anna then holds the electrode on the spot he has suggested and reads out the data that Max saves on the computer. Max reads out the next query, while their neighbor, Fred, approaches him again with his chair. Max turns towards him, saying "we have completely solved the voltage measurements by now". While Anna removes the connections from the panel, Max and Fred look together at the computer screen. Fred teases Max saying: "Maxi, this is not a problem, but you both, once again you are lightweights." Neither Max nor Anna responds to Fred. All three of them pack their personal items and leave the room together.

In this scene, the intra-active cuts that produce a binary gender order here were not as evident as in the examples before. However, we have a gender awareness based on gender-related teasing. In the example, it is pretty clear that the students, Max, Anna, and Fred, set the cuts themselves, as no pedagogic authority is involved in this interaction. Max initially teases Anna, and Fred subsequently teases the teamwork of Max and Anna. Both verbal exchanges have a derogatory tone, and there is no objection from Anna or Max and Anna after being teased. Instead, the derogatory remarks are powerful intra-active cuts ordering the gender relation and marking hierarchies: After teasing Anna, Max defines the experimental procedure and tells Anna where she has to measure the voltage – and Anna obediently follows his instructions. Max also feels free to comment on her work and the teamwork as a whole. Hence, he feels in charge of directing 'his' team based on the intra-active cut he initiated. This cut at the same time reinforces the chumminess with his male neighbor, Fred, who seems to be his primary contact rather than his team member, Anna.

3. Discussion

Within the different institutions and situations, different researchers observed different kinds of agents performing intra-active cuts in different ways. At primary school, the teacher appeared as an unquestioned authority, whose cuts, presented as orders, were followed without opposition. At the comprehensive school, the teacher stepped back from her authority and left a decision-making vacuum. At that point, a male teenager empowered himself to set an intra-active cut that enforced gendering in the classroom. His empowerment wasn't questioned loudly by those subjected to it. At university, the students were in a situation in which they could freely choose with whom to work; the teams' composition was left up to their personal preference and the cooperation was realized following gender-related teasing by the male student and his male neighbor.

The performance of intra-active cuts in all three situations dealt with gender concepts: At the primary school the teacher highlighted gender as a neutral, but central, criterion for the possibility to speak, thereby inscribing gender in the children's identities and perpetuating a binary gender order (Blaise 2005; Duggan 2004; Davies 2003). The cut was meant benevolently by the teacher Ms Fricke. She intended to create gender equality by treating all students equally, however, at the cost of forcing the children into a binary system. The principle behind the cut was a genuinely pedagogical one: Taking the child by the hand and leading them to the best place for them, according to the adult. Situated in the classical continuum of "leading" or "letting grow up" (*Führen oder Wachsenlassen*, Litt 1965), Ms Fricke's behavior was influenced by a pedagogical approach, which assumes that the teacher has the responsibility for leading the children and protecting them from growing into directions considered wrong, such as the supremacy of boys, girls or simply of the loudest ones, for instance. In most primary school classes, Hannes Leuschner observed that the teachers implemented some kind of gendered order, like Ms Fricke.

In the German public school system, the children usually leave primary school and continue with secondary school after four or six years. Once in secondary school, the German public school system regards pupils no longer as beginners on their way to adult life, but as intermediates. As young adults, they are allowed more freedom and considered being able to make their own choices, albeit still being legally forced to go to school. During her research at the comprehensive school, Katharina Bock experienced only one (female) teacher intervening in group-building practices in a gender-sensitive way. This corresponds with the assumption that the competence to act self-responsibly grows during puberty, as described by a wide range of common development theories (Jean Piaget, Erik Erikson, Rudolf Steiner, Maria Montessori, etc.). The corresponding pedagogical practice

observed by Katharina Bock in most of the classes was to let the pupils make their own choices.

At university, we are entering a young adult's space: The students are there as a consequence of their choice. By entering a university of applied science, they have entered a very masculine domain, both in terms of university teachers and of students (for example, Dasgupta and Stout 2014). In our example of winter term 2017/2018, only 15 per cent of students at the department of mechanical engineering and 11 per cent of the professors were female.[3] Hence, the study culture at the university of applied sciences is a highly gendered one. However, any attempt to prescribe who the students should work with, based on gender, would very likely be considered an illegitimate infantilization of the students. They are ideally considered as self-reliant and responsible as their teachers.

Despite all the differences between the educational institutions and the described settings and situations, the intra-actors in our ethnographic examples of gendering in educational institutions act in the same way: Ms Fricke, Daniel, and Max (as well as Malky) all initiate intra-active cuts, producing phenomena of gendering and getting entangled with the phenomena produced by them. Additionally, the spectrum of our vignettes shows that all situations ended up in some kind of *gender trap* (we borrow the term from Kane 2012): Binary perceptions were implemented, and a world composed of two sexes was installed at the researched institutions, inscribed in the participant bodies by material-discursive practices.

West and Zimmerman analyzed such processes of heteronormative prescription as *doing gender* (1987), later integrated into a larger framework of *doing difference* (West and Fenstermaker 1995). Post-structural feminist thinking (Dona Haraway, Judith Butler, and many others) joined the debate by highlighting that the discrimination between sex and gender is a powerful mechanism of generating difference in itself. We followed Karen Barad, who picked up such thoughts, by using the three ethnographic vignettes as examples of researching cuts in practices of gendering. In a second step, we want to discuss how we, as the researchers observing these scenes, stepped into the gender trap, and how ascription in the field notes constructs research findings on gendering. Or, to put it differently, are the researchers' agential cuts different from intra-active cuts in the field?

It seems as if we are just doing the same: We observe and collect data on-site, order and condense them into ethnographic situations, describe our vignettes as phenomena, and stay entangled with them, and – by writing about them – open our entanglement again for new diffractions and agential cuts. However, the dilemma appears when we describe intra-active cuts that enforce gendering. By describing differences, we can hardly avoid inscribing gendering once more into our data, because we also refer to boys and girls, male and female students, and male and female teachers all the time. In this process, we have to admit that we, as researchers, – despite our assumed best intentions – are trapped by gendering and our assumptions about it: For example, if Katharina Bock had participated in Ms Fricke's class, she maybe would have welcomed a cut like Ms Fricke's, which was problematized by Hannes Leuschner, who tends to take a stance very critical on adultism[4] and holds a fluid concept concerning gender. In contrast to Hannes Leuschner's personal preferences, Katharina Bock tends to highlight gender equality in her observations and calls for rethinking the way teachers deal with (in her view missing) gender equality. As the third ethnographic vignette demonstrates, Imme Petersen is gender-aware as well but is generally more restrained in showing her judgements in her data, as Katharina Bock or Hannes Leuschner do.

[3] Data source at the university's website is not given due to data anonymization.

[4] Adultism, following the definition of Adam Fletcher (2015: 7), means here a "bias towards adults, frequently dismissing people not identified as adults, for example children and youth. In turn, adults dismiss young people, promote an adultism, and bias towards adults, also: the addiction to the attitudes, ideas, beliefs, and actions of adults".

Hence, our attitudes towards gendering can be described as research-driven preconditions in our observations of gendering practices at educational institutions. These reflections have shown that the analytical distinction between agential cuts (of the researcher) and intra-active cuts (of the observed agents) set out by Taylor (2013: 691) is misleading, because both are agential and both are intra-active at the same time. However, if we still aim to distinguish our 'academic' or 'observing' cuts from the cuts we observe, another analytical distinction will be necessary. This leads us to the question: What is the role of the social sciences in the contingency of the quantum world – a microcosm, where everything seems fluid and nothing behaves anymore in the manner we are used to from the physical objects that we can see and touch.

3.1. Are we doing just the same – but in a different way?

Barad speaks of her approach as an *ethico-onto-epistem-ology* (see particularly chapter eight in *Meeting the Universe Halfway*, 2007). It is the "ethics" part in this compound word that is the step beyond the scientific implications of former interpretations of quantum physics, but it is a very tricky one. When waves are particles and matter is meaning, when everything is one (non)substance, only shaped into short-term differences that arise and decay, then there is no causal need to act ethically as we might generally understand it, no hint for a compound of the good, the beautiful, and the true. Onto-epistemological entanglements are, to the extent of the physicist's state of the art, everyone's and everything's physical reality. To make it ethical is 'our' (be it as ethnographers, be it as teachers, be it as students) obligation within this reality. In their overview of contemporary Barad studies, Gregory Hollin and his colleagues (2017) draw attention to the connection of Barad's concept of cuts with another key Baradian concept, which is response-ability:

"A focus on agential cuts is, therefore, generative of particular sets of ethical responsibilities; though matter itself has stability, it is still necessary to be accountable for the cuts that created this stability and grapple not just with the ethical consequences of these cuts, but with the constitutive exclusions that underpin them. It is this emphasis on cuts, we argue, that holds particular ethical significance, as becomes apparent when reading Barad against some of the most influential work which has engaged with her approach" (Hollin et al. 2017: 20).

Just as teachers do cuts while teaching, researchers perform cuts, first while researching, and then again by working with the data resulting from their research. What is the difference between the teacher's and the researcher's cuts? On a practical level, we see two points that make a difference, which are primarily communication practices rather than scientific ones. This means that they are not unique features of science-making, but they are necessary conditions of working in academia and open up the possibility of being part of an academic apparatus. The first point is an advantage of the researcher's position: They can pause before responding to anything. A pupil, asked by the teacher what is two plus two, typically does not have such a pause, nor does his teacher, who has to react to countless successive and simultaneous demands. In this respect, the researcher's position seems comfortable: They sit on their chairs and write down their notes in relative peace. Then they can take it home, discuss it with colleagues, friends, and relatives, and some day come up with a (usually written) response. The second point we would like to make is strongly favored by this possibility of pausing: We are not restricted by the urge to know something, but we are in a position to listen carefully to the theories surrounding us: "All life forms (including inanimate forms of liveliness) do theory. The idea is to do collaborative research, to be in touch, in ways that enable response-ability" (Barad 2014: 2).

In other words, it is our privilege to have the time to listen very carefully (that is, to do our research) and respond as response-ably as we can in our writing. Consequently, we have an ethical responsibility not only for our writing but also for the ones we are writing about. Responsibility implies, in our understanding, pow-

er. In our research setting, power can be expressed differently, for example, in practicing pedagogical authority or in academic writing addressed towards the academic discourse. Doing research in educational institutions can, therefore, be understood as an entanglement of two apparatuses: The apparatus of the educational institution and the apparatus of the researchers. During participant observation, the researchers find themselves in a situation of not only participating but also interfering in the field. What they write down in their notebooks is a kind of interference pattern (like the one that waves produce on the screen in the experiments described above) of what is happening within this situation. However, when they take their notebooks home to the office in order to transform this written material into data and to use it in further analyses, they gradually move further and further away from the apparatus of the field. In the worst-case scenario, they are just like ethnographers of the discipline's early days, who took the information they needed from the locals from the other side of the world, travelled back to their 'civilized' homeland (academia) and did whatever they thought right to do with their yield of data. In this process, they did not act responsibly concerning the apparatus of the researched field site. But how can we do better? What can we do to research response-ably in an ethico-onto-epistem-ological way?

Conclusion: Refining our instruments

By following an ethico-onto-epistem-ological way of research, we do not just aim to listen very carefully to the field and respond as response-ably as we can in our writing. We always have to remind ourselves that responding follows a call or a question. However, the observed ones, be they students, chairs, or teachers, haven't asked us for a response. We asked them to conduct our studies in their institutions. They gave their time and attention to us and our research and endured our observations during class and questions afterwards. At the universities, some supported us because they were researchers themselves and they knew that research needs support and cooperation. Others who we asked to allow us participant observation were interested in the idea of the project and wanted to support research that was understood to enhance gender equality. Still others felt there was an opportunity or duty to present their educational ideas and practices to the external public. We, as temporary visitors and *professional strangers* (Agar 1980), knew that we would not be able to fulfil all these explicit and implicit expectations. But, of course, in different ways, we tried to give feedback when asked for it, or when it was possible in the research setting.

At the primary schools, Hannes Leuschner explained the project to teachers and pupils and tried to clarify what it means in practice during many conversations. Many of the talks with teachers were about re-framing observations from the field or even having careful discussions about them. Researchers believing in pure, unaffected data may complain that such same-level-talk is changing the data. However, per Rolf Lindner (1981), in the view of Hannes Leuschner, such talks are a legitimate part of getting meaningful data, because an uncontextualized interview setting does not prevent the data from being changed, but it only changes the data in a different way. In the case of the secondary school, the feedback process was more institutionalized: The researchers agreed upon a report on the research results handed over to the school after the research was finished. Some critical voices might murmur that such 'pacts' might create conflicts of interest, but different expectations by the school, the teachers and the students could be adequately addressed and included in the research. Imme Petersen formalized what Hannes Leuschner did on an informal level. With every lecturer whose teaching practice she researched, she combined an interview before the participant observation in class and another some weeks afterwards. She experienced these meetings as productive in exploring backgrounds, experi-

ences, and meanings, but also challenging. Some of her informants disagreed with how they were mirrored in her academic analysis and she reacted with an attempt at translation or justification. In these situations, she was sometimes afraid of losing her sovereignty over the data.

In a positivist perspective that insists on a fundamental distance between the researcher and their research subjects, Imme Petersen's striving for independence may be understood as the ethnographer's loneliness; the researchers are ultimately not committed to the field, but only to the apparatus of academia. Barad, in her diffractive approach, points to the entanglement of the apparatus of research and the researched apparatus, but she also states:

"So at times diffraction phenomena will be an object of investigation and at other times it will serve as an apparatus of investigation; it cannot serve both purposes simultaneously since they are mutually exclusive; nonetheless, as our understanding of the phenomenon is refined we can enfold these insights into further refinements and tunings of our instruments to sharpen our investigation and so on" (Barad 2007: 73).

In this passage, Barad refers to the double-slit experiments again: Potentially, either a pattern formed by particles or one created by waves can appear on the screen, but only one will appear. To grab the which-way-information is a kind of agential cut that implicates a wave function collapse producing one physical reality instead of another. The same happens when a teacher gives permission to speak to one pupil instead of another, or when we present the selected vignette here and not a different one. Do cuts make any difference in the field we researched? We think that our cuts can be qualified as academic ones when they can function as intended: when questioned self-critically in order to refine our instruments, that is the ability to do cuts in the most responsive and, thereby, responsible way we can. This allows us to come back to the data and the field with instruments more adequate for dealing with the everlasting ambiguities of setting cuts. In the best case, such response-ability – developed in the privileged space of the academic apparatus – would be suitable for use beyond academia as well.

Conflicts of Interest

No potential conflict of interest was reported by the authors.

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Ethical standards

This research was carried out in accordance with the ethical standards of social and cultural anthropology (see "Frankfurt Declaration on Ethics in Ethnology"). The institutions and persons involved gave their informed consent. The collection and processing of personal data took place in accordance with the General Data Protection Regulation (GDPR).

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Commentary

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Introduction

I was delighted to receive an invitation to write a commentary for this article. I have framed my commentary as two agential cuts which engage with Hannes Leuschner and Imme Petersen's article in different and entangled ways.

1. Agential Cut 1: An affirmative reading

My first agential cut offers an affirmative reading, one that aims to explore the authors' thinking from the contexts and conditions that interest them. As a journal editor, I sometimes receive peer reviews on articles that want the author to have written the paper that the reviewer wants to be written not the one the author has actually written! Instead, affirmative reading means focusing on what is here, what is said, what has been done, and how this works as a theory-practice. Affirmative readings seek to displace destructive and negative modes of critique (Bozalek et al. 2019).

Hannes Leuschner and Imme Petersen outline Barad's agential realism as a means to overcome human exceptionalism and the hierarchical and dualistic thinking it rests on. They see agential realism as being about widening the orbit to include nonhumans in considerations of what matters. They draw attention to the neologisms Barad creates – intra-action not interaction, for example – which, along with other terms such as phenomena, entanglement, spacetimemattering and cut, are part of Barad's vocabulary for developing a vital feminist materialist philosophy of relations of entanglement. Leuschner and Petersen neatly situate Barad's agential realism within quantum theory (she is a feminist philosopher and quantum physicist) – see Fairchild and Taylor (2019), and rightly propose that the ontological shift her work inaugurates changes how we consider the relationship between the macro and the micro – and changes how we imagine and do research. This latter point is what their article is centrally concerned with.

Leuschner and Petersen discuss how, for Barad, apparatuses are material practices. Knowledge production is a material practice. As researchers we make agential cuts – that is, we make decisions "*to focus on something and not on something else*" (Leuschner and Petersen, 2021: 4) – and every single agential cut we make has consequences: it produces boundaries, exclusions and entanglements. Barad uses the phrase 'cutting-together apart' to denote this ongoing and dynamic process by which what comes to matter appears as meaningful while that which 'matters less' is backgrounded. As educators we enact agential cuts through, for example, including this text and not that text in the curriculum. As researchers, our agential cuts are to do with accessing this research site not that one or these participants' instead of those. Childers' (2013) article on the materiality of fieldwork is helpful in this respect. But our agential cuts are not always made with conscious intent, which would

be to reinscribe human agency into the process. Agential cuts are, instead, produced through differences and in/exclusions that emerge in the ongoingness of entangled relations. In one classroom I considered, for example, the classroom was overly full of desks and chairs and the particularity of that spacetimemattering had discriminatory consequences for a student who was a wheelchair user (Taylor 2017).

Leuschner and Petersen are interested in how processes of gendering occur through mundane actions and events in ordinary classroom contexts. Their article contains three interesting vignettes each of which focuses on the doing of gender as a materialisation of binary and heteronormative assumptions and practices. They discuss how the agential cuts which enact normative gender identities are entangled with power, authority and masculine privilege. What is important in their vignettes is how gender regimes work at every level of education – primary school, secondary school and higher education – and that they are not contested by those who are entangled within and constituted by them. Their vignettes use Barad's notion of agential cuts to illuminate the dynamics of how gender and power work through materialities of micro-practices and structural contexts. The article provoked questions: How do we change this so that we might become-other to the constraints of traditional gender identities? How can traditional gender stereotypes, assumptions and behaviours be deconstructed in education?

2. Agential Cut 2: A diffractive reading

My second agential cut engages a diffractive reading of/with Leuschner and Petersen's article. A number of years ago, I wrote about 'embodied diffractive musing' (Taylor 2016) to think about how critical posthumanisms and feminist materialisms can develop intellectual generosity to reshape critique in academia. I worked with Latour's (2004: 246) view that the "*direction of critique [is] not away but toward the gathering … with more, not less, with multiplication, not subtraction*", with Folkers (2016: 17) insight that diffraction "*changes what is put under critical scrutiny*", and with Mazzei's (2014: 742) observation that "*a diffractive reading . . . spreads thought and meaning in unpredictable and productive emergences.*" In this second agential cut I produce a diffractive reading to focus on some of the resonances Hannes and Imme's article gave rise to.

I was struck by the comment that "*no one except me seems irritated*" (p. 8). Ah, but in traditional research mode you would not make such an admission! In posthumanist, feminist materialist research such admissions are vital. The acknowledgement of being 'irritated' poses an irruption to normative frames of research reporting which requires the invisibility of the researcher behind a cool and objective appraisal and evaluation. Instead, this admission of irritation recognises the researcher as themselves part of the intra-acting phenomena unfolding in the classroom and in the act of researching. Irritation is a powerful affect. It is a mode of being-knowing that pays attention to how as researchers we are not individually bounded bodies whose properties set us apart from our research subjects. Affects swirl and entangle us as bodies-in-relation with ongoing intra-actions (Barad 2007). This took me back to my time as a doctoral researcher and my supervisor's suggestion that ethnographic research was about adopting a stance which rendered you as 'part of the furniture', that is mute, backgrounded, unnoticed. However, when I was in the classroom observing Malky (Taylor 2013) there was no opportunity to be 'furniture'. During my observations, Malky hailed me directly, asked me questions about theory, frequently drew me into his teacherly masculine performatives. It was uncomfortable and problematic. I felt squeamish about being included in this way. I wanted to be 'furniture' but his cuts prevented it. How do you as novice researcher negotiate matters of in/visibility? Where do you position yourself in the classroom? What do you say? What do you do? Even the act of observing, taking notes and sitting at the back or side of the classroom matters – that, too, is a cut, an enactment that positions and entangles you with bodies and materi-

alities in particular ways. Barad (2007) says 'every intra-action matters', that every intra-action is a cut in spacetimemattering, and that every cut is also an onto-ethico-epistemological matter. Following this line of thinking means we have to think very differently about ethics, beyond the completion of institutional ethics approval forms, and with each moment as it unfolds (see Taylor 2018 for some further thoughts on this point).

At another point in their article Leuschner and Petersen (2021: 5) ask: "*What do the moon and the stars care about our researching and experimenting on earth*?" This question resonates with me on a number of different levels. I happen to be reading Patti Smith's (2019) *Year of the Monkey* in which she says "*I felt a cosmic pull in multiple directions and wondered if some idiosyncratic force field was shielding yet another field*" (p. 24). Smith's writing is generically hard to place: a memoir of wandering and loss. Her mode of wondering, however, enacts a slow time that draws many seemingly haphazard threads of life together in productive speculation. I then think of the moon and remember my first degree in English Literature: male poets writing of the cold dead moon or the moon like a distant and inaccessible woman that they want to possess. I also think of the many science fiction films I have seen in which the stars and planets are colonised as humans flee from a planet they have exhausted, an earth dead from extraction and human destruction. It may be the case that the moon and stars don't know about our human experimenting. Nevertheless, we humans are tied into the moon's doings – its gravitational pull produces earth's tidal forces, causing oceans to rise and fall: tides and times – these are the moon's timespacematterings we (humans) are part of. The ocean's rise through global warming threatens our very survival, just as the millions of tonnes of plastic with which we have polluted our oceans have dealt death and destruction for many nonhuman species.

In the presents and after-lives of violences and damages wrought by the Anthropocene, an affirmative ethics (Braidotti 2013) urges us to develop practices that are more humble and relational, less human-centric and self-aggrandizing, less hubristic. In post-anthropocentric frame, then, perhaps it's not about whether the moon and stars care about us (why should they?!), instead it's about how 'we' can care more about them, and about the nonhumans, humans and habitats that capitalism and neocolonialism are so intent on destroying. Thinking-with the moon and stars and nonhumans is, then, a material practice of doing posthuman ethics as a mode of what Barad (2007) calls 'worlding', as relational response-ability not as self-centred individualism. We can make different agential cuts to promote practices oriented to more affirmation co-becomings.

Concluding

Thank you, Hannes Leuschner, and Imme Petersen. Your article considers instances and micro-moments of how gendered normativities materialise in the everyday doing of pedagogy and classrooms. This is important. Your article has thrown out threads of entangled connectivity across space and time and this commentary creates knots with a few of them.

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