

# New Materialisms, Older Ones, and New Genderings

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## Abstract:

The paper seeks to address the relationship between old and new materialisms. On the one hand, it analyzes the relationship between Marxist and new materialist ontological and epistemological frameworks. On the other hand, it situates new materialism in the context of feminist theory.

The first part describes the Marxist ontology developed by Hungarian Marxist philosopher Georg Lukács, and compares this ontology to Karen Barad's agential realism which serves as the onto-epistemology for much of feminist new materialist work. Lukács' and Barad's frameworks share the important goal of bridging the nature/culture divide, which they accomplish by proposing an ontology that equally applies to both domains. However, while Lukács still saw a qualitative difference and a hierarchy in value between inorganic, organic, and social being, new materialism eschews such boundaries and hierarchies. Further differences include new materialism's rejection of the reflection theory of knowledge, of the separation of subject and object, and of the traditional definition of objectivity as correspondence between reality and its representation. By proposing that reality comes into being as a result of our material-semiotic interaction with it, new materialism grants equal ontological status to matter and meaning, in contrast to dialectical materialism which is predicated on the assertion of the ontological primacy of matter.

The second part analyzes how feminist new materialism relies on and takes further key concepts introduced by earlier theorists of gender, especially Donna Haraway and Judith Butler. This is meant to point out both how feminist new materialism is rooted in these frameworks and how it differs from them, i.e. what does it innovate. New materialisms claim that matter and materiality is not only more relevant than it is assumed in other accounts, but also that matter and materiality has to be considered in a new way, different from older materialist accounts. The connected claim is that such re-consideration and re-evaluation of matter and materiality will not only bring about new understandings of subjectivity and humanity and its relation to a natural and cultural environment, but also and especially a new understanding of gender, new genderings. The goal might be to overcome the naturalization of hierarchical relationality of gendered organic bodies and their technological elaboration at large in order to develop methodologies for the humanities and the technosciences for investigating the interrelatedness of beings and things in all their variability in new ways.

## I – Feminist new materialism and dialectical materialism (Ágnes Kovács)

### Can/should there be a Marxist ontology?

Marxism is usually perceived as a political, social, or economic theory or social philosophy at best. This is also how Lukács saw it at the time of writing *History and Class Consciousness* (1923/1971, henceforth: HCC), his famous essay in which he introduced the idea of class-specific standpoints and put forward arguments in favour of the superiority of the standpoint of the proletariat in questions pertaining to economy, society, and their development over time. In HCC, Lukács explicitly restricted the scope of class-specific standpoints to the social world, claiming that Engels' attempt (1925/1954) to unfold the implications of Marxism for the philosophy of nature was misguided because Marxism had no such implications.

Later however Lukács came to consider this restriction – and consequently, the whole argumentation of HCC – as fundamentally mistaken; in the Preface to its second German edition in 1968, he declared that the philosophical ideas expressed in it “strike at the ontological foundations of Marxism” (Lukács 1923/1971, p. xvi).<sup>1</sup> By this time, he came to see Marxism as an all-encompassing worldview, with clear implications for all areas of philosophy, including what we now call theoretical philosophy, i.e. epistemology, metaphysics, and the philosophy of science. To correct the mistakes he thought he had made in HCC, and to elaborate his revised view, he wrote a 2000-page long treatise, *The Ontology of Social Being* (1984, 1986) in which he set out to get the ontological issues right, and to thereby develop the foundations of a Marxist ontology, or at least a sketch thereof.

When developing the Marxist ontology he envisioned, Lukács made extensive use of Marx's doctoral dissertation and of his *Economic and Philosophical Manuscripts of 1844* (1932/1964), which he helped to transcribe while working at the Marx-Engels Institute in Moscow in 1930 (Lukács 1971/1983, p. 179). Although commentators often contrast the early philosophical (speculative) writings of Marx with his later economic (scientific) work, Lukács always saw them as unity; he took the former to be the general framework for the latter. In the *Ontology*, he aimed to lay out what Marx must have thought about matters ontological so as to be able to come up with his critique of capitalism. Lukács thus saw his own contribution to philosophy in explicating and working out in detail the philosophical foundations which he thought were already there in the early writings of Marx.

Lukács' main goal was to elaborate an ontology that deals with all kinds of being in a unified, although not undifferentiated, fashion, instead of inserting an unbridgeable divide between (the philosophy of) nature and (the philosophy of) society. Treating various forms of being in a unified fashion means to recognize both commonalities and differences among them. In keeping with this goal, in the *Ontology*, Lukács distinguishes between three spheres of being: inorganic, organic, and social being (the world of humans), and conceives of them as having sequentially evolved from one another. Having been placed on a continuum, they all appear to be stages of the same process, namely, the evolution of being as such.

The two main tenets of Lukács' ontology are the historicity of all beings, and the spontaneous emergence of the categories of being in the course of its ongoing development.<sup>2</sup> The two claims are

<sup>1</sup> This preface, written in 1967, was included in the first English edition of HCC, published in 1971.

<sup>2</sup> For Lukács, content and form (being and its determinations or categories) are ontologically inseparable; being emerges in categories, and the history of being is the history of the transformation of categories.

related, and both follow from materialism (the view that the primary being is matter). For if the notion of a transcendent creator of the world is rejected (this much is the materialism of the view), an inherent tendency of matter to develop and organize itself into increasingly complex forms must be assumed. If being would not contain an inherent tendency to spontaneously develop and differentiate, the emergence of life on earth and human evolution could not have taken place.

According to Lukács, evolution of being occurs both within and across spheres. The emergence of a new form of being means the emergence of new categories that are specific to it. The evolution within one sphere of being takes place through the differentiation of these new categories, which gradually become predominant over the categories stemming from earlier stages. However, the new categories cannot entirely displace the old ones; the latter remain constituent of and effective in the new stage of being, although they might undergo substantial transformation and acquire new functions.

With respect to social being, the progressively growing predominance of the new (social) categories over old (biological) ones is what Marx called “the retreat of the natural boundary”. Social being (human societies) emerges on the basis of the biological existence of its members. In the course of the development of social being – which Lukács calls the “socialization of society” – biological categories gradually lose their significance. Besides, biological functions (such as alimentation and sexuality) become socialized, i.e. expressed in a distinctively social way and acquiring social functions. In the process, social being gains increasing autonomy from its biological basis, although it can never become completely disentangled from it. In other words, the socialization of society produces increasingly socialized human beings whose life is centred on distinctively social issues to an ever increasing extent, but who at the same time never cease to be biological beings as well.

It would be however wrong to think of human nature as constituted by the coexistence of the biological and the social, to picture a human being as divided into body and soul (Lukács, 1984, p. 13). For Lukács, the point is rather to show how distinctively human characteristics (reason, personhood, morality, etc.) grow out of the biological categories in the course of the historical development of society and of socialness, how complex categories of social being grow out of more simple ones and from labour in particular.

### **Mechanical vs. dialectical materialism**

On Lukács’ view, social being is different from natural being in that it is the product of labour, an act in which people consciously transform matter according to preconceived goals. The fundamental difference between animal and human labour is the consciousness with which humans perform it. Human labour is goal-oriented, and the goal is consciously posited. This insight is to be found in Marx’s (1867/1959) frequently cited passage:

A spider conducts operations which resemble those of the weaver, and a bee would put many a human architect to shame by the construction of its honey-comb cells. But what distinguishes the worst architect from the best of bees is that the architect builds the cell in his mind before he constructs it in wax. At the labour process, a result emerges which had already been conceived by the worker at the beginning, hence already existed ideally. Man not only effects a change of form in the materials of nature; he also realizes his own purpose in those materials. And this is a purpose he is conscious of, it determines the mode of his activity with the rigidity of a law, and he must subordinate his will to it. (pp. 283-284; quoted in Lukács 1980, p. 3)

Lukács summarizes this point as follows: “labour realizes a teleological positing in material being, thereby creating a new form of matter” (ibid). In other words, in labour, the entanglement of the material and the ideal moments acquires an objective (material) form; labour thus creates new objectivities, the elements that constitute social being. Social being is ontologically different from organic being by virtue of having been so created.

The novelty of this view lies in the conceptualization of the causal efficacy of the ideal element. The analysis of labour shows that

in the world of reality, realizations (the results of human praxis, achieved through labour) are introduced, new forms of objectivity not derivable from nature, which are however just as real as the products of nature are. [...]

Since realization thus becomes a transforming and new-forming principle of nature, consciousness, which has provided the impulse and the direction for this, can no longer remain an ontological epiphenomenon. It is with this statement that dialectical materialism cuts itself off from mechanical materialism. (Lukács 1980, 23)

Mechanical materialism<sup>3</sup> considers only nature and its laws as objective reality, and human consciousness and society to be the mechanical and predictable product of it. Philosophical idealism, on the other hand, views consciousness, values, and free will as originating from a realm that is fundamentally different and therefore underivable from material reality. In contrast to both, Lukács sees human consciousness, itself the product of matter, as an objectively effective force capable of creating new objectivities (new forms of matter) and a new sphere of being.

### **The onto-epistemology of agential realism**

Barad (1996, 2007) takes on the nature/culture dichotomy as well, which can also be framed as the problem of reconciling the claim of social studies of science scholars that scientific knowledge is socially constructed with a notion of realism. Barad argues that both nature and culture are constituents of the world as we know it. Drawing on Niels Bohr’s reflections on the philosophical problems of quantum mechanics, Barad argues that quantum phenomena exist solely in the interaction with the equipment by which we measure them. In contrast to Cartesian notions of the independency of object and subject underlying the positivist epistemologies of Enlightenment, the quantum mechanical object does not exist prior to measurement and it is thus not independent of the agencies of observation. Reality consists of phenomena collectively produced by the objects and subjects of observation; thus, reality is simultaneously material and cultural. This is what Barad means by ‘meeting the universe half-way’: human agency, i.e. observation is needed for ‘objects’ to manifest their characteristics. Reality does not exist prior to our encounter with it. This theoretical move renders the distinction between epistemology and ontology meaningless. Barad calls her theory *agential realism* because it secures agency for both observer and observed, with the important distinction that it is humans (and not electrons) who represents and interpret the phenomenon afterwards.

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<sup>3</sup> Lukács held that Marx himself was dialectical materialist. The mechanical materialists are those who preceded Marx (“old materialism”, i.e. the French materialists of the 18<sup>th</sup> century), and those who misunderstood him (“vulgar materialism”).

## **Dialectical materialism and feminist new materialism: Points of convergence and divergence**

There are many similarities but also crucial differences between the ontological and epistemological frameworks of dialectical materialism and feminist new materialism.

### *1. Social ontology and the ontology of nature: bridging the nature-culture divide*

Both dialectical materialism and feminist new materialism stress the importance of ontology and its primacy over epistemology. Second, both of them see the need to develop an ontology that pertains to both the natural and the social worlds, and ensures continuity between the two domains. Third, they see ontology and social theory as interconnected, with the implication that ontology is inherently political. We could say that in both frameworks, a general ontology is created by means of unfolding the implications of a social theory (historical materialism, and feminist theory, respectively) for social ontology, and then extrapolating it to nature. In consequence, the chief values that characterize Marxism and feminism as the theoretical underpinnings of the respective social movements show up in the ontologies promoted by them.

### *2. Boundaries and hierarchy between different spheres of being*

One of the important goals of Marxist theory was to provide a rationale for socialist revolution. Marx described the history of Western Europe as the succession of socio-economic formations, which represent progressively more efficient modes of production. It follows that the communist society he envisioned would be superior to the capitalist social order in terms of economic efficiency and the realization of the human potential. The view of history as progress is central to Marxist epistemology and ontology. In epistemology, it serves to justify the epistemic superiority of the standpoint of the proletariat and to thereby avoid epistemic relativism. In ontology, it fits in with the more general idea of the spontaneous development of being within and across its three spheres. Hence Lukács saw a qualitative difference and a hierarchy in value between the inorganic, organic, and social spheres. By contrast, but similarly for political reasons, feminist new materialism stresses the importance of erasing these boundaries and hierarchy between spheres of being, as they could provide models and justification for hierarchical relations between people (see the discussion on pp. 8-9 in Part II of this paper).

### *3. Reflection vs. diffraction as epistemological models*

The reflection theory of knowledge is the thesis that reality exist independently of the knowing subject and that knowledge means having a more or less correct mental image of this independently existing reality. For Marxists, the view that all things that really exist have a mind-independent existence is in fact what defines materialism.<sup>4</sup> Thus in *Materialism and Empirio-Criticism*, Lenin writes:

the 'naïve materialism' of any healthy person who has not been an inmate of a lunatic asylum or the pupil of idealist philosophers consists in the view that things,

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<sup>4</sup> In *History and Class Consciousness*, Lukács himself denied the reflection theory of knowledge, claiming that the separation of subject and object was expressive of the standpoint of the bourgeoisie and of its interest in merely contemplating reality rather than changing it. He proposed to replace the dichotomy with the notion of the identical subject-object of history, which was the proletariat. This however restricted the scope of Marxist epistemology, predicated on the unity of subject and object, to the social world. Recognizing the importance of the continuity between (the philosophies of) nature and society, he reinstated the reflection theory of knowledge in the *Ontology of Social Being*.

the environment, the world, exist independently of our sensation, our consciousness, of our self and of man in general. [...] Materialism deliberately makes this 'naïve' belief of mankind the foundation of its theory of knowledge. (1908/1947, pp. 68-69)

One of the main goal of agential realism is to overcome this view which Barad calls representationalism (2007, p. 28). Agential realism argues that phenomena emerge (come into being) through intra-action between subject and object. This difference leads to different conceptualizations of objectivity in the two epistemological frameworks. In dialectical materialism, objectivity refers to a correspondence between representation and that which it aims to represent, whereas in agential realism, objectivity is a function of the extent to which the agencies of observation (i.e. the knowing subjects) are aware of being embedded in particular social, historical and cultural contexts in which knowledge is being produced (Barad, 1996, p. 180).

#### 4. *The ontological status of the material and the semiotic*

Lukács conceptualized social being (and only social being) as having been created by means of the externalization (materialization) of human consciousness. He further claimed that in the course of the development of social being, the categories that are specific to it (cultural, ideological factors) acquire increasing importance and finally become predominant over material determinations. These claims however do not affect the assertion of the ontological primacy of matter over consciousness, which in Lukács' view defines materialism. The primacy of matter means that there can be matter without consciousness but there is no consciousness without a material carrier. The ideal element always presupposes the existence of the material one and remains ontologically dependent on it.

Agential realism not only argues for the entanglement of matter and meaning (throughout nature and society) but it also grants equal ontological status to them. According to Barad, the basic ontological units of what we perceive as (natural or social) reality are phenomena, which emerge as a result of our interaction with the natural and social worlds. The things that interact do not pre-exist phenomena but are rather produced by and in this relation that is both material and semiotic. Being does not exist prior to signification (Barad 1996, p. 176) and "reality itself is material-cultural" (p. 185). By proposing that reality comes into being in the course of our material *and* interpretative engagement with it, new materialism grants equal ontological status and causal efficacy to matter and meaning.

## II - Feminist new materialism and theories of sex and gender (Waltraud Ernst)

### **The founding of new materialism in feminist theory**

New materialisms have not emerged suddenly in an independent way; rather, as we would like to demonstrate here, they have developed from older materialisms and feminist theory continuously. The best example to illustrate this is the work of the biologist and feminist science studies scholar Donna Haraway, who figures as one of the main references when it comes to relate new materialism to an extant body of knowledge. In 1986, Haraway fundamentally located her epistemic, ethical and political research perspective within a materialist framework. Today, one might consider this framework as older materialism, as a Marxist view, focussing on the question of who is profiting and who is suffering from material living conditions produced by the development of new technologies during industrialization and automatization. But Haraway also clearly diverges from a classical

Marxist position within the “Cyborg Manifesto” (1986/1991), when she describes and criticizes what she frames as cyborg conditions of life. She urges for a socialist-feminist politics addressed to science and technology, but she refuses any totalitarian or dualistic world view.

This means, first, that she diverges from the feminist mainstream position of these days, which analyzed power differences too simplified into two neatly separable groups of gender. That means, second, by putting the critique of dichotomous thinking as an ideology of Eurocentric patriarchal modernity and rule at the centre of her theorizing, she refused to reproduce the essentializing of the master/slave and capitalist/worker dichotomy of classical Marxist materialism. Third, the Marxist idea that change is most likely to come if the dichotomy gets strengthened in order to provoke revolution, is also abandoned. Fourth, in criticizing psychoanalytic approaches in feminism as well as ‘radical feminism’ for essentializing the category of woman as a unifying identity and experience, Haraway identified feminist mainstream as a white bourgeois feminist position, which emphasized that women have qua gender all the same or similar social positioning as passive victims of patriarchy and as housewives and mothers. Haraway criticizes then important figures like Catharine MacKinnon and associated her own criticism with Chela Sandoval, Cherrie Moraga, feminist science fiction authors like Octavia Butler and other protagonists of a forming women of colour movement that emphasized the multifaceted positionings and material living conditions of women of colour. This grounding of her analysis in – predominantly – women of colour being exploited as preferred workers in the “integrated circuit” of the technoscience-based industries at the same time as she interweaves it with the insightful analyses and poesies of women of colour in the 1980s as Chela Sandoval, Gloria Anzaldúa and Audre Lorde anticipates what is discussed today more widely under the label of intersectionality, introduced as an analytical framework for anti-racist feminist scholarship and politics by Kimberlé W. Crenshaw (1991).

This is also a main difference to the feminist historical materialism of Nancy Hartsock (1983). Hartsock developed a feminist standpoint epistemology on the basis of the development of a historical consciousness of those who have allegedly similar living experiences in the gender segregated labour market. In her view, women experience in a more direct way the basic material needs of living in their social function as care givers, nurses, cleaners, and cooks than men, who were alienated from those in the labour market. Therefore, these material experiences should give the orientation for a new epistemological world view – for what counts as reality and how to study it - and consequently for social transformation. The revolutionary acts promoted in the “Cyborg Manifesto” consist besides a strategy of a more comprehensive understanding of work and organizing of workers rather in ongoing acts of subversive reinterpretations of the world: “Feminist cyborg stories have the task of recoding communication and intelligence to subvert command and control” (Haraway 1986/1991, p. 175). Haraway is convinced that in reconstructing the boundaries of daily life material significant changes will become manifest. On this way, Haraway sets the ground for new feminist materialisms as developed from the older ones and feminist theory, especially informed by a women of colour movement. She does so even more in developing the concept of ‘embodied objectivity’ in her famous paper “Situated Knowledges” (1988/1991). There she developed an understanding of bodies as objects of knowledge as material-semiotic knots, where boundaries are materialized in social interaction (Ernst, 1999, 140ff). Even more crucial, also subjects of knowledge are embodied in this account. This means, that knowledge claims are related to particular – material – positionings of those bringing them in. This results in the partiality of every viewpoint on the world and the necessity of an initiation of conversations with others in webs of connections. In contrast to positivist (rationalist or materialist) modernist Eurocentric,

anthropocentric and androcentric accounts of epistemology, objectivity cannot be reached by a single researcher (or ‘everyone’) following a strict heuristic pattern, but is defined here as “the joining of partial views and halting voices into a collective subject position” (Haraway, 1988/1991, p. 196). This is interesting for a new materialist stance on epistemology as it points to the relevance of the material, yet possibly shifting, condition of knowledge production, whereas no position and viewpoint is either innocent or worthless, but open for discussion. Barad’s definition of objectivity thus connects clearly to Haraway’s notion of objective knowledge as situated knowledge. With the emphasis on the performative dimension of the research apparatus, agential realism goes one step further: scientific (and other) knowledge production is part of a – constantly shifting – performative constitution of reality – as a powerful reality producing agent.

### **How feminist new materialism differs from older ones and what does it innovate**

The onto-epistemology of agential realism takes on and develops further certain concepts in feminist theory. Two such issues are the notion of relationality and the concept of apparatus. With her epistemological approach of 'agential realism', Barad shifts Niels Bohr's framework of relativity of knowledge production in quantum physics to a framework of relationality. Within Barad’s account, the establishment of an apparatus of research is an integral part of the epistemic process and hence of the phenomenon of investigation. We want to clarify, what it means in this account to analyse this very apparatus of research. Is it a means to shift the normativity of the gendered diffraction patterns it might produce? Does it enable the notion that materials and phenomena are linked in a complex and never fully apprehensible relationality, in which processes become activated through scientific research, in a way that goes beyond the intentionality of persons and the calculation by machines?

In her book *Meeting the Universe Halfway*, Karen Barad gives an interesting example how to ask crucial questions about bonding, belonging and boundaries of material organic bodies. Barad introduces the brittle star, living in deep and dark spaces of the ocean, as an example of an organism for queerness beyond human practices of living. Interestingly, when it comes to the brittle star the relatedness of a (singled out) body to the “environment” surrounding it becomes blurred:

Brittlestar species exhibit great diversity in sexual behavior and reproduction: some species use broadcast spawning, others exhibit sexual dimorphism, some are hermaphroditic and self-fertilize, and some reproduce asexually by regenerating or cloning themselves out of the fragmented body parts. When is a broken-off limb only a piece of the environment, and when is it an offspring? (Barad, 2007, p. 377)

She asks even more to the point: “Is contiguity of body parts required in the specification of a single organism? Can we trust visual delineations to define bodily boundaries? Can we trust our eyes?” Barad concludes: “Connectivity does not require physical contiguity.” The crucial question seems to concern the relatedness in connection with the generation of organisms: “Is the connection between an “offspring” regenerated from a fragmented body part and the parent brittle star the same as its connection to a dead limb or the rest of the environment?” (ibid). With the brittle star Barad does not only give a telling example of variations on the multifaceted ways sex, gender and sexuality is organized in natural environments, but also provides fundamental insight to the various research apparatuses turning to it (see Ernst, 2014, pp. 152-153).

Karen Barad suggests her approach of agential realism as a new feminist epistemology to understand matter, including the gendered body, as a dynamic intra-active becoming. With this account she claims to go beyond Judith Butler’s approach of performativity of gender, because she

also includes non-human organisms and non-organic matter in these intra-active processes of becoming. Butler introduces the term apparatus to point to the fact that a specific or current normative understanding of gender is more material than the term 'framework' or 'interpretation' would suggest: "If gender is a norm, it is a form of social power that produces the intelligible field of subjects, and an apparatus by which the gender binary is instituted" (2004, p. 48). The term apparatus seems helpful to understand the imperative character of gender as a valid social mechanism. At the same time, it helps to imagine the possibility to change certain aspects - parts or tools - of this mechanism, or even exchanging it as a whole. Since an apparatus is a complex instrument which is built and installed to achieve a certain goal, the term expresses the historical contingency of a certain gender regime. In other words, if we understand gender as an apparatus by which subjects are produced through performing and incorporating a certain femininity or masculinity in present time in dominant cultures, those who do not fit therein might be intelligible as subjects signalling the limits of the apparatus at work and the need to change it.

Butler and Barad both seem to understand an apparatus as provoking a certain set of material-semiotic practices. However, Butler's focus is on the constitution of gendered subjects through performative iteration, while Barad focuses on the constitution of (gendered) research objects and phenomena through intra-active becoming: "Apparatuses are dynamically made and remade through different kinds of boundary-making practices" (2007, p. 449). Hereby, it is important to note that in both accounts the clear cut differentiation between subject and object is contested. For Barad, the research question is already part of the phenomenon produced in the epistemic process as the apparatus gets installed. Her understanding of matter is not limited to the empirical data which get collected or measured within a certain established apparatus, or to the interpretation of these data. Maybe in a comparable way, Butler's account shows gender as performed by human subjects within, but precisely not consistent with the existing binary apparatus of gender. Exactly by way of (necessarily) failing to reach the established idealized binary code, Butler points to the apparatus of gender as an elaborated institution. In a similar way, material phenomena intra-acting within the epistemic process in Barad's account are never fully calculable in advance by the apparatus of research (see Ernst 2014, pp. 154-155).

Here, the innovative take on the relationship between different spheres and modes of being becomes evident in the divergence from anthropocentrism and the elaboration of an onto-epistemic positioning which may lead to a more holistic view, a posthumanism (Braidotti, 2013). This means that an important point of critique is not only the androcentrism, but also the anthropocentrism of the older materialism. Barad questions the clear-cut boundaries between organic matter and non-organic matter, as well as those between the organism and the 'environment'. With this understanding of humans as just one curious organic entity between an indefinite number of others, she opens our eyes for a big variety of natural systems of reproduction as well as interactive or intra-active relationality and attachment. In this way, the current binary gender system, which still seems rigorously binding for humans, might get contested in its exemplary function for nature as a whole. This means for scientific accounts of the world or "nature" that anthropocentric attempts which read or project patriarchal relations into animal behaviour, might be overcome. In other words, one of the most important claims of new materialism lies maybe in its stake in posthumanities (Åsberg, Koobak, & Johnson, 2011). There, the question of perceiving and acknowledgement of the non-human and even the non-organic as important features for the understanding of the entanglements of the world. So, feminist new materialism differs from older ones through a radical pluralisation of relevant (more or less) natural/social, material-semiotic agents.

### **New genderings**

It has been widely claimed for a long time by science and also by many feminist accounts that femininity and masculinity rely somehow on natural/material dimorphism of organic, especially human bodies. Brain organization theory has been identified as a major agent for the production of this view in the second half of the 20<sup>th</sup> century. In an encompassing study *Brain Storm*, Rebecca Jordan-Young (2010) has shown that the organization theory of the brain has influenced particularly life sciences, psychology and sociology with the theory that gender identity and behaviour is predetermined by prenatal hormonal ratios during prenatal brain development. She made evident, that this theory cannot be empirically validated when the empirical studies get evaluated through their own heuristic norms. Instead, as the global network of neurofeminism has shown, brain dimorphism does not describe sex/gender in an adequate way (Dussauge & Kaiser, 2012; Schmitz & Höppner, 2014). Moreover, Rippon, Jordan-Young, Kaiser, and Fine (2014) point out that within neurosciences the entanglement of sex/gender becomes evident. It is not only the case, that male/female differences in neuroimaging can be modified, neutralised or even reversed. The concept of entanglement takes this a step further: social phenomena also influence the biology of the body. Learning processes, for example, leave neural traces, this means that the structure and function of the brain changes.

The brain cannot be considered anymore as a fixed solid entity, as the organizational theory of the brain suggests, but must be understood as plastic (Bluhm & Jacobson, 2012). Neuroimaging research shows that even the endocrine system changes with the social surrounding and experience (Vidal, 2012). In an experiment with rodents, it could be measured, that the oestrogen receptor binding increased significantly in several parts of the brain of male mice through the practicing of active fatherhood with newborns (Fausto-Sterling, 2000, pp. 239-240; see also Ernst 2014, p. 159). In a similar way, it is argued, that social differentiating or un/equal opportunities of participation do not only produce social inequality in education or daily experiences and alter (gendered) behaviour, but these phenomena also influence the brain and our hormone system. Therefore, gender phenomena are incorporated into the biological sex. Those two entities are inextricably entangled and cannot be spoken of in a radical independence. Therefore the term sex/gender is preferred (Springer, Stellman, & Jordan-Young, 2011; Fausto-Sterling, 2012).

As a suggestion for feminist research methodologies, Deboleena Roy (2012) develops a vocabulary on "a flexible assemblage of feminist practices to motivate the feminist scientist to pick up and run with her own set of sensations and desires" (p. 325) and she suggests to read a scientific paper closely, in order to discover potential pathways for this move. Roy (2012) thinks that it is a way to develop a "'feeling around' for divergent forms of life, such as proteins, hormones, receptors, and neurons" in order "to produce new zones of proximity" (p. 203).

This leads to the hypothesis, that in order to understand and achieve new genderings in new materialisms, organic as well as inorganic existence has to be conceived in a new way. If it is a normative regime of power and knowledge which differentiates living organisms in categorical hierarchies or any categories with more or less clear cut frameworks of belonging and exclusion, it will be the challenge to think beyond this worldview. It is in this way, that new materialism may offer new ways to investigate the social, symbolic and material reality of sex, gender and sexuality without reinforcing binary gender norms.

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