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Feminist and Queer Repoliticizations of the Brain.

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The historical relationship[1] between biology and feminist politics is one of proximity and distance, of tensions and contradictions. This is particularly obvious in the current golden age of neuroscience, when arguments supporting sexism, the inevitability of the sex/gender difference, and the equalization of sexuality with heterosexuality, for example, are reformulated based on the findings from brain research. The neurosciences have come to function as an arena where contemporary Western societies expect to resolve increasingly more social and political issues, and seek to use it exclusively to explain human behavior (cf. Ortega et Vidal 2007). The conflicted link between feminism and the neurosciences is unsurprising since, as sociologist Bruno Latour (1988/1984) notoriously formulated and as was later reiterated by biologist and philosopher Donna Haraway (1984) : “science is politics by other means”. Over the past decades, many different feminist engagements have had to deal with the public figure of a deterministic brain and biological explanations of sex/gender differences.

In this paper, we give insight into the multifaceted feminist stances on neuroscience from the 1980s up until today[2], thus contributing to the field of queer studies and feminist neuroscience by analyzing the field with respect to the different approaches and stances that have emerged in and from neuroscientific research. We map out the field in order to localize our academic roots, take a closer look at which interdisciplinary research questions may be posed today, and how or if this academic output can be used outside academia, for instance, by activist communities. Our objective is to interrogate these different stances in terms of their relationship to other feminist fields of research, their conditions of possibility, as well as their political costs. Additionally, we aim to trace the history of a feminist neuroscience back to its first points of origin and present how these beginnings changed from neuroscientific scientific lab work (e.g. Ruth Bleier) to scientific criticism of neuroscience (e.g. Fausto-Sterling) and later to looking for a way to put gender theory on the neuroempirical research agenda (e.g. Roy 2012, Rippon et al. 2014). We recognize and support the generative potential of interactions between feminism and neuroscience, and further argue that feminist, gender and queer studies can benefit from the knowledge created in scientific experimental settings. We conclude this paper by recognizing the importance of integrating biological laboratory work into this research as well as into political arenas. Nonetheless, the trends analyzed and our own argument should be read both as forms of resistance against a colonization of political issues by “hard sciences”, and as an ongoing “cerebralization” of feminist politics, which are situated within the historical context in which biology reigns and assumes the position of a new hegemonic science of the human.

Recapitulating multifaceted feminist and queer approaches to neuroscience enables us to clearly identify three major endeavors : early feminist critique of the neurosciences (“destabilizations”) ; possible convergences between feminist projects and neuroscience (“reconstructions”) ; and the ways social movements use neuroscientific arguments (“recontextualizations”). Against this backdrop, we argue that these stances can repoliticize the brain and the neurosciences in a time where there is a tendency to naturalize the brain and prioritize neurosciences over other sciences of the human.

Because neuroscientific contributions have often remained in the shadows of heteronormativized understandings of feminism, we insist especially on an alliance between queer thoughts and movements with feminist projects, and in certain cases also on the specificity of these queer agendas — also for neuroscience[3].

The stances described here hold possible contradictions and it is our goal to depict these antagonisms as part of our interdisciplinary project through the use of a “dissensus framework” (Kraus 2012).

Destabilizations.

Biology and biological knowledge of the body has been a central arena for political struggles during second-wave feminism. In particular, feminists and scientists in the “radical science” movement were championed by the work of many, including Hilary and Steven Rose (1979), who opposed the sociobiological agenda and its unequal view of society and the human. A main point was — and still is — that biological science reflected, naturalized and thus also justified the social norms and hierarchies of its time. Exposing the tendency in mainstream sciences to naturalize inequalities based on gender, sexuality, race and class, biologists (along with others in the feminist movement) engaged with science as part of a political struggle (*ibid*.). However, the brain did not play a significant role in the struggles of 1970s, during the second wave of feminism, reflecting the fact that at that time, the brain had not yet become an object of *governmentality* (Foucault 2010).

Feminist critique of neuroscience.

Just because there was no substantial focus on gender in neuroscience does not mean that no research was being done. Two early feminists who did early work on destabilizations within the neurosciences — and whose work serves as the basis for our (and others’) feminist and queer approaches — are Ruth Bleier and Anne Fausto-Sterling. Elizabeth Wilson’s research also belongs to this earlier feminist critical body of work. More recent important contributions have been made by Catherine Vidal, Sigrid Schmitz, Rebecca Jordan-Young and Cordelia Fine, Anelis Kaiser, Deboleena Roy, Daphna Joel, Emily Ngubia Nuria, Hannah Fitsch, Robyn Bluhm, Robyn Bluhm/Anne Jaap Jacobson/Heide Lene Maibom, Gillian Einstein, Victoria Pitts-Taylor, Odile Fillod[4].

In summary, Bleier, Fausto-Sterling and Wilson all formulated fundamental critiques of neuroscience from a feminist perspective. Our aim here is to outline and make visible the feminist research that was done already a generation before. We sketch the feminist roots in/of neuroscience in order to reveal how destabilizations were introduced to the field and briefly outline their historical origins.

As a neurophysiologist, Ruth Bleier was able to combine feminist and biological knowledge in a unique manner. She paid extensive attention to the feminist critique of the "context-stripping" methods applied in neuroscience to make the "political biological" or the "historical natural" (Bleier 1984b, 1988, p. 70). She also identified many flaws of compulsory sex-difference brain research and argued against sociobiological and deterministic assumptions that have infiltrated neurobiological research and "in essence den[y] the unique qualities of the human brain" (*ibid*.). In an empirical neuroscientific paper that she co-authored with William Byne and Lanning Houston (1988) on the human corpus callosum, she showed a sex/gender similarity, not difference, in the splenium, which her colleagues had begun to codify as sexed at that time (e.g. DeLacoste-Utamsing and Holloway 1982). This latter work can be seen as a "better" way (Harding 1991) of doing neuroscience, since this research was conducted from a feminist standpoint from within empirical neuroscience. Bleier's main topic of neuroscientific interest was the hypothalamus on which she wrote several books (e.g. Bleier 1983, 1984a). Interestingly, the hypothalamus (together with the hypophysis) is probably the most sexed and sexualized area in the brain, because for decades, it has been argued to be the center that "monitors" the supposed ontological origin of sex/gender : the instance of control of reproductive functions.

Biologist Anne Fausto-Sterling played a seminal role in mainstreaming a feminist critique of biological theories of sex differences, neurobiological studies being a part of them. The second edition of *Myths of Gender* (1992) addressed the neuroscience of sex/gender differences, which came out of research during the 1980s and early 1990s and dealt with issues such as intelligence, verbal ability, and many others. In *Sexing the Body* (2000), she broadened the scope of the neuroscience of sex/gender differences and sexuality that she had previously scrutinized. Based on a large corpus of neuroscientific papers, Fausto-Sterling demonstrated that the corpus callosum is not easily be broken down into two distinct forms — female and male. Previously taken as scientific facts proving sex/gender difference in the *splenium*, she revealed measures taken that show how this difference is constructed scientifically and how neurobiological matter is put into classes and groups that are subsequentially proven to be "naturally" given and distinct entities. The size of the corpus callosum, the sex/gender coding of sexual activity in rodents, and the neuroanatomical studies of the gay brain are some of the areas that Fausto-Sterling examined.

Both these feminist scientists addressed the problem of constructing neuroscientific facts about difference regarding sex, gender and sexuality. Like Bleier, Fausto-Sterling criticizes attempts of science and neuroscience to distinguish components of embodied life that cannot be disentangled. As recognized scientific scholars, Bleier and Fausto-Sterling had an empirical advantage that made them key figures in the project of feminist science. Perhaps more easily than their colleagues outside biology, they were able to transport feminist insights into the labs and make scientific background knowledge and methodological information available to their fellow scholars working on feminist issues on science.

Elizabeth Wilson explored the potential of biological theories for feminist concerns in *Neural Geographies* (1998) and continued this thread in *Psychosomatic* (2004). Convinced that "we will find a greater productivity in biology than theories of gender would lead us to believe" (*ibid.*, p. 62), she provocatively proposed that feminism "may gain its most effective political purchase on biology" (*ibid.*, p. 18). However, Wilson was also critical of neurobiological research. She contributed to a destabilization of neuroscientific research, for instance, by drawing on Le Vay's studies on the homosexual brain (Le Vay 1991, Le Vay and Hamer 1994) and arguing for a multiple divergence of sexualized nuclei and nuclei volumes. By challenging dimorphism with an enormous number of synaptic connections, neural pathways or biophysiological communications,

Wilson excavated the complex and ambiguous relation between simple or symmetrical forms and widely dispersed ones in the brain (2004, p. 55ff). Nonetheless, Wilson is also rather ambiguous with regards to the neuroscientific project of mapping the human or regarding sex/gender as an attribute of the brain. She argued for a *decerebralization* of our medical as well as cultural understandings of subjectivity by proposing, for instance, that we focus on the "guts" as the central place in the body's nervous system where subjective processes, such as feeling and thinking, take place (2004).

In the past years, many researchers[5] have produced scientific critical reviews of the neuroscience of sex/gender. Their works address the limitations or flaws in the field and the gaps between neuroscientific outcomes and their "public life" in popular science books and the media[6].

According to sociologist Hilary Rose and neurobiologist Steven Rose, a difference between recent critiques and earlier feminist and critical work about the neurosciences may be the scope of their criticism, which they say has come to focus more on "the micro-production of scientific knowledge" (Rose and Rose 2011, p. 18) and less on the broader political context. They write :

Earlier generations of critics, both feminist biologists […] and radical Marxist critics of genetic determinism such as Richard Lewontin […] saw "context" as less circumscribed. For them, it encompassed the entire social framework in which science is embedded. These earlier scientist-critics sought to reveal and contest the social values — of sexism, racism and class — that lay within and behind biological determinism. (ibid.)

Critique of the neurosciences of sexuality.

Critical studies of the neuroscience of sexuality are related to the neuroscience of sex/gender. Some of the criticism resembles the feminist comments on mainstream neuroscience, as they addressed biology on its own terms. Much of the critique of the "emergent program" (Stein 1999) of biological research on homosexuality in the 1990s respectfully engaged with the scientific arguments proposed by neuroscientists Simon Le Vay (1991) and Dick Swaab (Swaab and Hofman 1990) or geneticist Dean Hamer (Hamer, Hu, Magnuson, Hu and Pattatucci 1993). Other researchers critiquing research on the gay brain, such as Edward Stein or Anne-Fausto Sterling (2007), closely worked with biological arguments and exposed their limits and/or flaws and, sometimes, at the same time, their potential, such as Elisabeth Wilson (1998). Yet others, such as ethicist Paul Wolpe (2004), critized the simplistic reduction of sexuality to culturally specific dichotomies (homo/hetero) and the reduction of lived experience to blunt determinist schemes (Dussauge and Kaiser 2012).

Furthermore, psychologist Peter Hegarty, sociologist Hilary Rose and anthropologist Roger Lancaster addressed "the entire social framework in which science is embedded" (Rose and Rose 2011, p. 18) and interrogated the conditions of possibility of that emergent neuroscientific program. Hegarty (1997) addressed the heteronormative substrate that made it possible to perform this knowledge, and argued that this biological knowledge was sustained, performatively, by heterosexist norms, which it thus also contributed to reinforcing. Rose (1996) pointed out that the disputed assumption that the brain has a sex is pivotal to the neuroscience of the gay brain, which predictably casts the gay brain as a sex-inverted brain. This fits nicely with Hegarty's observation that the neuroscience in the 1990s regarding sexual orientation draws on and reproduces the heterosexual matrix, i.e. culturally equating gender with sex and with attraction towards the opposite sex/gender. In turn, Roger Lancaster (2003) problematizes the relation between the

biological science of homosexuality and its contemporary US context. Lancaster shows that we cannot just say that science is reactionary in the way it conceives of sex, gender, and sexuality because it emerges during a reactionary time. Lancaster demonstrates that popular culture in the 1990s, such as TV series and social movements, can be regarded as much queerer than contemporary scholarship on the science of sexuality. He thus proposes to consider this paradox as part of a broader social change, in which increased sexual rights and freedom goes together with the hardened opposition to these changes, and that the science of sexuality happens to be part of the conservative countertrend. Notably, Lancaster did not imply that the 1990s saw the end of heterosexism. Rather, his point was that popular culture got ahead of academia as, from the 1970s onwards, LGBT people began acquiring certain formal rights and liberties[7].

Whereas Lancaster is right not to read science as a straightforward reproduction of a conservatism imagined and idealized by scholars, instead allowing science to be read as a part of any trend, it is slightly unsatisfying to not clearly see why biology — as a science — would have to be socially conservative rather than oppositional. After all, many feminists have argued that biology — the living matter — is far more alterable than social structures (Star 1979). We elaborate on this in the next section on feminist re-constructions of neurobiology.

Destabilizing the heteronormativity of the sexed/gendered brain and its determinisms.

All the above cited feminist work on sex/gender and sexuality share the fact that they destabilize the cultural and biological construct of a “naturally distinct” and essentially biological brain. They especially oppose the cultural assumption that there is a strong link between brain, sex, gender and sexuality. This link draws the contours of sex/gender as a stable difference inscribed in stable neurobiological traits. Following this line, behavior comes from the brain and gender flows naturally from sex (Butler 1990). Destabilizing the “biological brain” implies destabilizing the dichotomous and heteronormative line, which runs from sexed brain to gendered behavior. This destabilization therefore echoes Judith Butler’s queer disentanglement of the triad sex, gender and sexuality. Destabilizing the biological brain also demands destabilizing the equation of sex to brain, and gender to behavior (Schmitz 2011, Joel 2012, Kaiser 2012, Rippon et al. 2014). Implicitly, and sometimes explicitly, such destabilizations defy the centrality of the brain as much as specific brain factoids of sex/gender[8]. In other words, the feminist literature reviewed here also destabilizes the sexed/gendered brain by questioning the assumption that we are our brains (cf. Ortega et Vidal 2007).

Reconstructions.

In the previous section, we emphasized the significance of destabilizing through critique. However, what happens beyond those destabilizations, or what happens after the critique ? In the following section, we go further and address existing and other possible feminist approaches to neuroscience. We aim to theoretically entangle concepts of neuroscience and with those of gender studies and take a closer look at possible epistemological convergences, which we refer to as “reconstructions” of the brain in the neurosciences.

Let us imagine that “biology and neurology are not the natural enemies of politics” (Wilson 1998, p. 62). Then there must be some ways of possible interdisciplinary exchange, even if these exchanges may be tense or conflicted. In the following, we diffractively (Barad 2007) think about

those entanglements by reflecting on the deconstruction of a “constructing” neurolaboratory ; second, we discuss the possibility of multiplying rather than rejecting difference (Schmitz and Höppner 2014, Roy 2012) and third, we consider the contributions and perils of considering an agentic materiality of the brain. These conceptual intertwinements can be regarded as preparatory work for an affirmative and “reconstructive” feminist empirical neuroscience for feminist neuroscientific laboratories in what we hope is the near future.

Renewing the empirical question of sex/gender in neuroscience.

In the 1990s, especially following the strong claims of Rubin (1975), West and Zimmerman (1987) and Butler (1990), the scientific categories of sex/gender and sexuality were deconstructed and studied as social systems and practices. Since then, the position that sex/gender and sexuality as socio-cultural phenomena and as a result of human actions within normative power contexts have emerged as dominant themes of gender research. What if we carry this understanding into the experimental lab and ask if sex/gender can be approached as fundamentally deconstructed in neuroscientific experiments as well ? Elizabeth Wilson notes that “deconstruction does not produce new, improved theories from its labours” (1998, p. 23)[9]. Thus far, many (e.g. Einstein 2012, Palm 2010, Roy 2007) have observed that neither these newer understandings of sex and gender nor the feminist critique of neuroscience have led to the development of any major concrete empirical program for feminist neurosciences. Taking this into account, we follow another path listening to Bruno Latour’s injunction : “The question was never to get away from facts but closer to them, not fighting empiricism but, on the contrary, renewing empiricism” (2004, p. 231). So why do we still shy away from and leave it to others — notably those not concerned with the emancipatory character of sex/gender and sexuality — to form ontologies of sex/gender and sexuality (Palm 2010) through neuroscience and biology ?

We draw on several feminist approaches and suggest that feminist neuroscience should use neuroscientific experiments to explore the subversive claims that all sex is already gender (Butler 1990) and the related intellectual positions (e.g. the “not-nothing” of naked sex, cf. Kraus 2005). The purpose is not to qualify the theory, but to open up new empirical spaces for neuroscience.

Neuroscientific explorations of the notion that sex is already gender confronts us with a main force of scientific empiricism : the power of difference (Kaiser 2011).

Multiplying sexed/gendered differences in the brain.

As Michel Foucault (e.g. 1976), Judith Butler (1990, 1993) and others have shown, the materiality of our bodies is inevitably and constitutively intertwined with relations of power through regulatory norms. Most prominently, one such norm through which sex is materialized is the dichotomization of sex/gender, which obviously also takes place in neuroscience, where the very materiality of our bodies cannot be addressed outside the male/female dichotomy. A “hard variable”, gender binarity is one of the inevitable starting factors in an experimental neuroscientific setting — not a result, but a constant determinant of any act and fact in the lab. For instance, MRI devices are programmed so as not to start with scanning unless one of the variables “F” (female) or “M” (male) (besides name, weight and size) is checked in the box as a prerequisite[10].

Several medical, biological and sex/gender scholars have recently argued that neuroscience ought to multiply difference : in sex/gender (e.g. Fausto-Sterling 2000, Joel 2011, 2012) and along many different axes of power or social orderings. Roy (2011) proposes that we work more with

difference : re-multiply difference and politically relevant categories of difference, attend to multiple difference not only between people but within people, and explore what these differences are in and of themselves. What do we learn, studying materialized difference, about the workings of power ? Rebecca Jordan-Young and Raffaella Rumiati argue, in a similar move :

A second promising direction is to turn our backs on sex/gender differences […] more research on the ways in which sex/gender patterns in brain and behavior are specific to social class, ethnicity, and nation might provide much more illumination on the concrete mechanisms through which the social world shapes behavior, and even becomes embodied (brain) difference. (Jordan-Young and Rumiati 2012, p. 312)

The body and brain's embodiment of the social world and sex/gender categories leads us to focus on what is going on inside the brain, its very materiality. With that, we are in the midst of the recently renewed interest for "matter" and "materiality" in feminist theory[11].

The brain in the context of new feminist materialisms.

We agree with the common argument that the self or subjectivity is productively regulated and constituted in relation to normative discourses, practices, and social relations (e.g. Rose 2004). If we take the notion of constitution seriously and quite literally, how exactly can we extend the claim of a sexed/gendered construction to the brain itself, those 1.3 kilograms of cerebral biology with its own material rules, its own ecology ? Following Butler and regarding matter not as a fixed site or surface but as a "process of materialization" that becomes stable over time so that solidity, fixedness and the sense of boundaries can emerge (Butler 1993, p. 9), we can understand brain materiality as something "in the doing" and thus always as performativity. Thus, we consider that a materialization of sex/gender and power performatively takes place inside the body and in its brain matter, leading the brain to acquire a gendered, sex-differentiated material constitution. We propose that a feminist empirical neuroscience takes as its object of study these processes of materializations in order to redefine and reconstruct sexed/gendered and sexualized *corporealities* in brain and body. The question is only if we are courageous enough to "get our hands dirty" (Palm 2010) and empirically create new ontologies of a sexed, gendered and sexualized brain.

Such a program would be related to ongoing and earlier work in feminist neuroscience. Feminist biologists such as Ruth Bleier, Ann Fausto-Sterling and Sigrid Schmitz have argued for a view of biology as changing, flexible systems, constantly entangled with the social world (for a recapitulation of these views in their own context, see Richardson 2010 or Rippon et al. 2014). In neuroscience, this view also relates to the parallel often drawn by feminists between the Butlerian notion of the performativity of sex/gender, and the neuroscientific notion of plasticity, i.e. the understanding that the brain structure gets reorganized throughout a lifetime based on life experience (cf. Kaiser et al. 2009, Nikoleyczik 2011, Pitts-Taylor 2012, Schmitz 2002, C. Vidal 2009).

Such a program is also related to philosopher Karen Barad's conceptualization of a self-active matter : "[…] any robust theory of the materialization of bodies would necessarily take account of how the body's materiality — for example, its anatomy and physiology — and other material forces actively matter to the processes of materialization" (2003, p. 809).

By regarding matter as capable of agency, i.e. by considering matter as provided with the intra-active capacity of contributing to its own "doing" and becoming, Barad emancipates matter from

the limited role of responding to its surrounding only. Matter is instead generative and becomes part of a performative construction (Barad 2007). It contributes to the production of meaning, although not pre-discursively. Here, another way of reconstructing new gendered brain *materialities* becomes evident. Since a scientifically examined agential materiality regains — to some extent — the function of contributing to the bodily genderings, it also regains the potential to gender matter in potentially subversive ways.

Coming back to the agency of materiality, we ask : to what extent — if any — of self-contained and possibly subversive agency do we want to ascribe to brain matter itself ? In other words, we know that biology can be "[…] no less, and perhaps in some areas, far more, mutable than socialization" (Star 1979, p. 116), but who is this ascription up to, and on which epistemological basis ?

Moreover, Barad does not claim that brain matter determines behavior or social relations, but how exactly would we distinguish, conceptually, between an agency of cerebral matter and "new neurological determinism", i.e. the idea that knowing the exact physiological state of the brain would enable the prediction of behavior (Schmitz 2011) ? These issues illustrate the fact that the continued formulation of an empirical agenda for feminist neuroscience is always closely related to the pitfalls of a new deterministic neuroscience in the sense of "brain determines behavior". It is clear that feminist neuroscience must address subjectivity and the materialization of power as fully embodied phenomena and refuse to isolate the brain from the body as well as from the world. But how can this aim be pursued without *essentializing* agency as a driving force that comes independently from within the brain? We believe that the answer may only be formulated in empirical explorations.

To sum up, feminist neuroscience can, and does, reconstruct the brain by purposefully transporting concepts from gender studies into neuroscience and vice versa, and by considering the brain a site for differential inscriptions and productions of power[12]. An agenda is emerging that creates a convergence between post-structuralist and queer-feminist notions of materialization with neuroscientific understandings of material change and, potentially but not undisputedly, agency.

However, when creating such convergences, it is of relevance to recognize the power of academic disciplines in this context (Maihofer 2005, Palm 2003). There are limits in interdisciplinary research, limits in methods and theory, and limits that result from disciplinary subjection of our academic curricula. There are also asymmetrical relations of power between disciplines, where the culturally and financially weaker part is expected to make constructive efforts and cross-disciplinary bridges in order to mitigate conflicts. It is thus crucial for feminists who work between the disciplines to not always aim to fill in the disciplinary gaps, but rather to recognize the moments when we might instead acknowledge conflicts and rely on a "dissensus" framework (Kraus 2012).

Recontextualizations.

Is a queer and feminist brain really enough to save us from scienticized sexism ? Well, not really. If the brain is a crucial arena where late 20th and 21st century Western cultures expect to explain and govern societal issues such as sex/gender conflicts, educational, economic or social inequities (Ortega et Vidal 2007), then the brain itself is a "matter of concern" (Latour 2004). In the arena of the brain, the neurosciences occupy a privileged position : they are granted the legitimacy to utter

the truth about the *cerebralized* issues debated in the arena. Much of the contemporary feminist critique of neuroscience (maybe less so of the critique in the 1970s), feminist and queer neuroscience and feminism inspired by neuroscience take stakes in this matter of concern and approach their critical and political struggles within the arena of the brain. We agree with, celebrate and participate in these developments.

But there are limitations to these engagements : the feminist interventions we have addressed so far may tend to reproduce the *neurocentrism* of the arena of the brain in their own science. Neurocentrism is crucial and inherent to neurosexist claims (Fine 2008) and to the current neuroscience of sex/gender. If the brain was not as central to the person as our cultural enamorment with the cerebral subject contends, then of course current neurological facts and factoids of sex/gender would not have the weight and legitimacy they have come to enjoy.

This is why we are interested in engaging with the re-politicizations of the brain affected outside academia. Here we discuss some of the feminist, queer and subversive interventions taking place outside the arena of science. These interventions tend to position themselves not so much in debates about “matters of facts”, but rather create new configurations of “matters of concern” (Latour 2004). Therefore, they help us see contemporary matters of concern regarding the brain and neurosciences outside laboratories and beyond the making of scientific facts.

What is at stake are power/knowledge relations in the age of evidence-based activism, the reinforcements of the arena of the brain and neurosciences, and the possibility to perhaps displace it. Drawing on existing scholarship, we ask : how have social movements used brain arguments for progressive causes, at which political costs ? What are the possible *positionings* for feminist politics beyond matters of fact ?

Let us now regard the scholarship on the political life of the brain as a cultural construct starting with the ways in which activists have worked with brain arguments of sex/gender.

Norm-critical uses of brain claim.

Philosopher Cynthia Kraus (2010, 2012) has analyzed the trans’ and intersex’ movements’ uses of theories of brain sex in their political struggle for rights. Both movements found useful support in the neuroscientific claims that the brain has a defined sex at birth (male or female), and that there is a specificity to the trans brain and the intersex brain, respectively. Kraus shows that the notion of an innate brain sex has enabled the trans and intersex movements to claim brain types of their own, corresponding to gender identities not borrowed from a *cis*-world[13].

There are good reasons to view the intersex and trans brain arguments as subversive. They are in line with the “neurodiversity” discourse, Kraus argues. Neurodiversity refers to the political claim that there is a natural variation amongst brains, that this variation is inherently good for humanity and society and that it should, therefore, not only be accepted by the majority society but valued in its own right (Ortega 2009). In some way, we might read this as a brain version of Queer Nation’s now seminal demonstration slogan “We’re here, we’re queer, get used to it” from 1990[14], but also as a parallel to the gay science of the 1990s (cf. Kraus 2011 and 2012 for a political history and analysis of the endorsement of brain sex theory by intersex movements).

Many feminists have endorsed the notion of brain plasticity as social constructivism in a less oppositional, but still progressive manner, and pitted this against both conservative biological determinism (cf. e.g. Bleier 1984b, Schmitz 2011) and the old ghosts of social determinism[15].

Political costs.

These strategies of repoliticization of the brain as a tool for political struggles are active recontextualizations of scientific claims in political fields, which come at two main political costs for the social movements involved.

First cost : buying into the individualist or new-determinist worldviews that sustain the specific notions of the human, sex/gender and sexuality that most neuroscientific discourse builds on and feeds back into. For instance, the diversity-discourse of difference flattens difference because it opens up the possibility for a positive reevaluation of the margins of normality, but at the cost of losing a critique of the power of normality. More generally, the brain version of the human sustained by the current ideology of the cerebral subject is in many ways a modern, liberal subject (e.g. Maasen et Sutter 2007, F. Vidal 2009). The discourses of neurodiversity and plasticity are no exceptions, as they assume that we all have unique brains that reflect and impact our unique individual life conditions (Kraus 2012, Schmitz 2012). This relates to what we discussed in the previous section, namely that plasticity does not only allow for adaptations that continue a life long, but also plays into the hands of bio-regulative power and forces us to exploit all our capacities and skills. Kraus (2012) argues that feminists and critical scholars should criticize the discourse of the idiosyncratic, unique brain being part of the “personal turn” in politics, which further individualizes the political issue of gender inequalities and depoliticizes the very political field it was working in, thereby undermining possibilities of political action.

Second cost : buying into a political economy of biomedical knowledge in which social movements (e.g. feminist or LGBT movements) do not get to contribute to the production of neuroscientific knowledge. Mobilizing notions of brain sex/gender ties our social movements to brain discourses we cannot easily shape. This leads either to the uselessness of the brain argument or to a subordination to neuroscientific facts beyond influence.

In the case of brain plasticity, one possible stance is that the pro-plasticity feminist movements buy into plasticity as if it were infinite and as flexible as the diversity of social-theoretical theories would require. Useful plasticity implies, then, that the brain does not matter at all (in a Baradian sense) : it’s an accommodating brain, which does not influence the human. The politically useful plastic brain is thus paradoxically inert, not biologically alive : a brain that does not and should not matter to the very struggles it is recruited to assist with. This is a counterproductive way of politicizing the brain, which gives a deceptive neuroscientific gloss to a neuro-skeptic argument and reinforces problematic neurocentric discourses.

Or, a second possible stance for a feminist embrace of the plastic brain would be to take neuroscience seriously on the notion of plasticity and accept that the brain is plastic only to a certain extent, in certain areas, under certain conditions and more during certain moments of life than others. The problem becomes not only how these moments of neuronal plasticity are established, but who establishes that knowledge. The feminist movement is then subordinated to the good will of neuroscience to abstain from neurosexism, or to the utopia of a feminist neuroscience.

These two costs for minority movements’ use of brain arguments are part of a political economy of neuroscience : who benefits from neuroscientific knowledge, at whose expense[16] ?

Feminism, the neurosciences, and some of their sociological configurations.

In this article, we sought to analyze and discuss contemporary feminist and queer stances towards the brain. We hope to have made visible a broad and at times even contradictory variety of feminist engagements with the brain and the neurosciences. The antagonisms between the positions are not surprising given the wide political spectrum of feminist stances towards science (cf. Rosser 1992 for an early overview).

We have revealed that the subject of investigation can be addressed by a three-fold approach consisting of the description of the origins of early neuroscientific lab work, contemporary interdisciplinary research between neuroscience and gender studies and activists' use of and reference to neuroscientific outcomes. We have argued that destabilizing, reconstructing, and recontextualizing are ways of repoliticizing the brain.

In the first section, we presented several examples of how biological and other examinations destabilize established binary notions of the sexed/gendered and sexualized brain. This critique upholds the depoliticization inherent to the naturalization of social hierarchies and categories of difference. It destabilizes both neurocentrism and the alignment of neuroscience with conservative approaches to difference. It questions the conditions of possibility and popularity of heterosexist science.

In the second section, we approached the ongoing feminist epistemological reconstructions of neuroscience and the brain. In conjunction with the existing scholarship, we argued for a renewed feminist agenda in neuroscience. We identified the Butlerian claim that "sex is gender" as an important tenet for such an agenda. We also reflected on the possible contributions of new feminist materialist notions of agency to possible feminist reconstructions of the brain in neurosciences. We also emphasized that poststructuralist empirical feminism in neuroscience can only be driven by a reflexive ambivalence between complexity and reduction.

In the third section, we addressed political recontextualizations of the brain within activist struggles and critical scholarship outside neuroscience. We examined the political costs and benefits of using neuroscientific claims as part of queer, trans*, intersex or feminist struggles. We asked which configurations of the expertise provided by our social movements enable a queer neuroscience and interrogated the limits of a queer and feminist neuroscience project. As queer scholars, we embrace much of the ambition of queer studies to politically intervene in the fields we study. We share the view that scholars outside neuroscience may contribute to a repoliticization of the construct of the brain by producing politicized, non-neurocentric, non-biological discourses about the brain, the human and society.

Finally, we present here some concluding remarks on what sociological configurations of involvements in the political economy of neuroscience are thinkable.

The trans*, intersex and most feminist movements engage with neuroscience within the frame of what sociologist Vololona Rabeharisoa (2003) has called an "auxiliary" relation[17]. This means that a dialogue takes places between the established producers of knowledge and the concerned advocacy group or social movement on the outside, in which some members work to become lay experts (Epstein 1996). The power relation is largely unchanged : medical scientists produce knowledge about a minority. Much interdisciplinary work with unequal relations of power (see

also Kraus 2011) tends to fall within that category. Feminist/critical approaches from non-neuroscientists have proposed, for instance, that neuroscience should use reflexivity as a main inside tool for working towards a better neuroscience (e.g. Choudhury, Nagel and Slaby 2009, Nikoleyczik 2011).

An “emancipatory model”, by contrast, works with an advocacy group that ensures themselves the delivery of services to the minority group to which they belong. Examples of this are community health centers in the United States (Rabeharisoa 2003) and feminist biology projects such as *Our Bodies, Ourselves* (Boston Women’s Health Book Collective 1973). A fundamental point of analysis here is that the lack of expert knowledge about the concerned minority stems from its status as a minority. In addition, the minority group should handle expert scientific knowledge themselves outside of majority services, or distance themselves from it. In such an emancipatory relation to neuroscience, feminist and queer movements would not only have to acknowledge the lines of political (sex/gender) conflict, but also organize and produce expert neuroscientific knowledge. Here, we recognize the promise that queer and feminist neuroscience hold.

Accompanying the emancipatory recognition of an unjust political economy of knowledge is the notion of scientific sacrifice as a universal good. Instead, the emancipatory model goes in one direction : knowledge should be better organized to benefit the minority group (women/queers/feminists/…). What would neuroscientific research that embraced such aims look like? Norm-critical queer feminist neuroscience may accomplish this by taking the workings of power with the body and brain as its object of inquiry.

What is at stake here is the privilege — and the possibility — to articulate what is assumed as knowledge about sex/gender in the brain. Not intervening from a feminist position means leaving it to non-feminist others to formulate the facts concerning sex/gender and the brain. However, these others do not work in ways that we can accept from a scientific standpoint, not least due to often outdated notions of sex/gender. This means it is up to us to bring about interdisciplinary research in this field. We elaborated on this in the second section. In a sense, we — and many others — are obliged to participate in re-sexing/re-gendering the brain if our aim is to conduct research that is founded on a sex/gender-informed basis. Along the way, we may even *de-sex* the brain and behavior, while re-gendering them in unexpected ways.

However, these scenarios or configurations of participation do not shed light on the crucial question : what do we (who is “we” ?) need to know more about ? And when/why do we (who is “we” ?) need a scanner for that ? This reminds us of ethicist Paul Wolpe’s point about the neurosciences of sexuality (2004). Additionally, and closely related, we have not yet answered the question of who primarily wants to change science (and through this, society as well) or who aims to alter society (and through this, science as well), and if these different feminists can always follow the same common goals.

Questions of participation in the making of neuroscientific knowledge easily behave as if neuroscience was the only science relevant to an emancipatory and subversive science of the brain. It is time to raise other approaches as generative of possibilities. Can critical studies — from the social and human sciences — say something about the brain outside neuroscientific discourse ? That is, can their function be any different than making a constructive contribution to the neurosciences ?

We suggest that the production of such non-neuronormative discourses about the brain are crucial

and that a possible shape they take on is to analyze the brain's place in Western culture and within our specific societies. A political aspect of such a project is, of course, the destabilization that is achieved through deconstructing our understandings of the brain. But another way to politicize our analyses is to give analytical precedence to political conflicts over scientific controversies. This means that the formation and settlement of scientific controversies, for instance, whether or not the brain has a sex/gender, can only be explained by a historically informed analysis of the political fields and struggles in which the scientific controversies emerge, as mentioned section two. In other words, grounded in questions raised in the human and social sciences, we need to continue to produce scientific discourse about the brain as something other than a piece of biology. The brain is, can, and should be described as a cultural object, a political arena, a hegemonic and contentious figure of the human being itself.

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Note

[1] This article is a slightly modified version of the paper « Repolitisations féministes et queer du cerveau » that was published in *Revue d’anthropologie des connaissances* (vol. 7, n° 3 : p. 667-692) by Isabelle Dussauge and Anelis Kaiser (2013). We would like to thank the anonymous reviewers for their comments that helped improve this paper. The research on which this article is based has benefited from a research funding by the Swiss National Research Foundation and the Swedish Research Council. We would also like to thank our colleagues from the network *NeuroGenderings* for the multifaceted knowledge and inspiration they have provided.

[2] An important part of the scholarship we review here came to our attention with the constitution of the network *NeuroGenderings*. The aim of this network is to elaborate innovative theoretical and empirical approaches to address the question of sex/gender and sexuality in the brain ; to analyze the social and political underpinnings of the ongoing “cerebralization” of human life and especially of sex/gender ; to evaluate the current state of neuroscientific methods, evidence, and interpretations regarding sex/gender and sexuality in the brain, to theorize the role of “race” in constructing sex/gender neurobiological differences, and to uncover the Eurocentric “nature” of neuroscientific research.

[3] Elsewhere, we have outlined a definition of “queer” in the context of brain sciences (see Dussauge et Kaiser 2012).

[4] There were and are still other feminist scholars working at the edge of or within neuroscience that need to be named : Jenny Kien (1999), Marianne Regard (2000), Claudia Wendel and Sabine Heel (2002), Kirsten Jordan Quaiser-Pohl et Jordan, 2007), Cordula Nitsch (2000), Svenja Matusall (2011), Katarina Hamberg (2000).

[5] Bluhm, Jaap Jacobson and Maibom (2012), Caplan and Caplan (2009), Dussauge (2013a), Einstein (2007), Eliot (2009), Fine (2010, 2012, Grossi et Fine 2012), Hamberg (2000), Joel (2011, 2012), Jordan-Young (2010, Jordan-Young and Rumiati, 2011), Kaiser et al. (Dussauge and Kaiser 2012, Kaiser, Haller, Schmitz and Nitsch 2009), Kraus (2010), Kuria (2012), Nikoleyczik (2011), Roy (2011), Schmitz (2002, 2010, 2011), Sommer et al. (2008, 2004), Vidal (2005, Vidal and Benoit-Browaeys 2005), and Wallentin (Wallentin et al. 2009).

[6] Most recently, neurobiologist Joel presented two articles claiming all brains to be intersex (2011, 2012). She argues that the brain is made of an “ever-changing heterogeneous mosaic” (2011, p. 1) of “male” and “female” brain characteristics of the brain, meaning that there is, neurobiologically speaking, no completely “female” or “male” brain (2011). She further postulates that although a genetic-gonadal-genitals sex (3G-sex) exists in most humans, sex/gender differences in the brain are not dimorphic or permanent (2012).

[7] It may seem paradoxical that 1990s’ binary, determinist and gender-conservative neurobiological theory of the gay brain could be headed by the prominent gay neuroscientist Simon Le Vay and promoted as a “gay science” that many viewed as emancipatory. But in its context, the paradox might not be as contradictory as it appears. Among others, the neuroanatomical studies on the gay brain emerged in the specific context of the renewed stigmatization of gay people in the era of the deadly AIDS epidemic and, in regards to gender and sexual politics, in the aftermath of the Reagan and post-Reagan government’s aggressive backlash politics against feminism and gender/sexual minorities. The renewed salience of homosexuality as a political question, and of arguments that sexual preference was inborn, must be understood as entwined with a *repoliticization* of gayness along contradictory political lines.

[8] The term “factoid” was coined by Norman Mailer in his biography of Marilyn Monroe (1973). In a later interview, Mailer defined factoids as “a fact which has no existence on earth other than what’s appeared in the newspaper and then gets repeated for ever after. So people walk around as if it is the blooming lively fact” (Lennon 1988, p. 194). In academic settings, historian Franz Georg Maier used this concept to denote “mere speculations or guesses which have been repeated so often that they are eventually taken for hard facts » (Maier 1985, p. 32). Maier noted that “the tendency to get stronger the longer they [the factoids] live is one of their most insidious qualities” (*ibid.*, p. 32). The social life of factoids is thus similar to that of facts : as the history, anthropology and sociology of science teach us, the life cycle of a fact/-oid is not a result of its truth-value, but rather of its trustworthiness and its mobilization by actors, institutions, discourses, etc.

[9] See similar points made by e.g. Sedgwick (1990), Rose and Rose (2000), and more critically proposing new directions for critique, Latour (2004).

[10] Specifically speaking, the norm underlying this is that there is (could be ?) a sex/gender difference in the specific absorption rate (SAR) of brain matter. SAR is a measure of the energy that is absorbed by the human body when exposed to a radio frequency electromagnetic field. It is mandatory to control for the radiofrequency energy absorption by the study’s participants, however, what counts here is the relation between body weight and size. Even if sex/gender played a role in full body MRI, it is more than questionable why the biology of the brain should differ between women and men.

[11] The “novelty” of this recent discourse on matter and materiality has been a subject of discussion. Here, we share Sarah Ahmed’s point (2008) that materiality was never out of focus in feminist and gender studies. Although the recent call for more materiality (e.g. Alaimo et Hekman 2008) may seem evident, it is not true that the deconstruction of sex/gender had led to an eviction or even negation of the material body (e.g. Duden 1991, Kirby 2002). Ahmed warns against such claims and their consequences, and demonstrates that materiality never lost attention in feminism or gender studies, especially because feminism in/of science has always engaged closely with materiality and the biological (e.g. the work of Donna Haraway, Bonnie Spanier, Lynda Birke, Janet Sayers, Evelyn Fox

Keller, Adrienne Zihlman, Sarah Franklin, Linda Fedigan, Sarah Hrdy).

[12] Note that there also exist critical projects which echo the project of feminist neuroscience but with a set of partly different concerns and goals, such as the Critical Neuroscience program (Choudhury, Nagel and Slaby, 2009) and the Neurocultures Manifesto (Pitts-Taylor, 2012).

[13] The term “cis” is used to refer to the consistence between birth-assigned sex and the gender identity a person has, has adopted and/or has been socialized with. About *cis*-normativity, see e.g. Cavanagh (2010).

[14] Queer Nation was a short-lived radical sexual activist group who went down in history with the Queer Nation Manifesto, a pamphlet distributed during a march in New York in 1990, which came to mark the establishment of queer movements in the USA and internationally.

[15] These ghosts tend to be summoned mostly by anti-feminist and conservative discourses, for instance inspired by evolutionary psychology. See e.g. Dussauge (2010).

[16] Homosexuals, transgender and intersex people are routinely used to produce neuroscientific knowledge that is not about homosexual, transgender and intersex lives and does not benefit homosexual, transgender and intersex people. Gay populations are often used as a tool to disentangle gender from sexuality in the neuroscience of sexuality ; and trans and intersex populations are used as hormonal laboratories to test hypotheses about the biology of *cis*-gender (Jordan-Young 2010). Those are examples of the scientific exploitation of homosexual, trans and intersex bodies in the mainstream neuroscience of gender/sexuality : producing knowledge about certain bodies for the benefit of other bodies.

[17] Here we use only two of the three models characterized by Rabeharisoa (2003) : auxiliary and emancipatory, but not the “participatory” model whose conditions of existence are not met here.

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