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Ombre Tarragnat

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# Biodiversity, neurodiversity, ethodiversity: towards a more-than-human and more-than-neurological turn in neurodiversity studies

OMBRE TARRAGNAT

*Laboratoire d'Études de Genre et de Sexualité (LEGS)*

*Université Paris 8 Vincennes Saint-Denis, France*

[ombre.tarragnat@gmail.com](mailto:ombre.tarragnat@gmail.com)

*This article explores the relationship between neurodiversity and the life sciences – specifically biodiversity and neurology – in order to call for a more-than-human and more-than-neurological turn in neurodiversity studies.*

*I first examine how Judy Singer's conception of neurodiversity is based on an ambiguous engagement with biology and directed towards anthropocentric human rights politics. In this conception, neurodiversity constitutes a form of biodiversity without nonhuman animals. This anthropocentric bias in the neurodiversity lexicon reinforces the divide between humans and animals.*

*The article then shows how neurocentrism – the emphasis on nervous systems – in neurodiversity studies often leads to neuroreductionism, which reduces lived experience to the physicochemical. In assimilating neurodivergent people to lesser humans, this rhetoric bestialises neurodivergence. While neurology itself is not fundamentally flawed or regressive, the way it is often taken up in the neurodiversity movement leads to problematic effects, which leads me to conclude that neurological accounts should be decentred.*

*Aiming to renew neurodiversity's engagement with the life sciences, I call for a more-than-human and more-than-neurological turn. To do so, I turn to ethology and develop the concepts of ethodiversity and ethodivergence. Ethodiversity refers to the intra- and inter-specific variabilities and differences in animal behavioural patterns or existential styles. Ethodivergence describes ways of being and behaving that depart from the ones dominant in one's species, in one's ecological and social milieu, and/or imposed by anthropocentric ethonormativity. Both concepts are finally elaborated drawing on conservation biology and philosophical ethology.*

KEYWORDS: biodiversity; neurodiversity; ethodiversity; ethodivergence; philosophical ethology

## Introduction

What role should our animality (or humanness) and our relationships with nonhuman animals play in shaping our understanding of human neurodivergence? Is neurodivergence a typically human thing or a fundamental dimension of animality itself? These questions, which relate to core aspects of the definition of neurodiversity and neurodivergence, have received very little attention in neurodiversity studies and the neurodiversity movement until now.

Asking the question of animality in neurodiversity not only implies exploring the intersection of neurodiversity studies with animal studies but also rethinking parts of the foundations of the field. In-depth research is needed to clarify the role that animality has (or perhaps, has not) played in the historical development of neurodiversity studies and the neurodiversity movement. With this paper, I investigate one of the many sites where the intersection of neurodiversity and animality unfolds: neurodiversity studies' relation to the life sciences, and more specifically, to biodiversity and neurology.

Neurodiversity studies, as a field of scholarly research that followed the development of the neurodiversity movement at the end of the twentieth century and in the first decades of the twenty-first century, has, from the outset, displayed some degree of engagement with biology. This is evident in the very terminology of the field: the term 'neurodiversity' explicitly mirrors the concept of 'biodiversity' and the field's ongoing engagement with neurology further cements its relationship with the life sciences at large (Singer 2016, 27).

First, I use Judy Singer's definition of neurodiversity as a subset of biodiversity to demonstrate a tension between the biological roots of neurodiversity and its anthropocentric political horizon (1). Then, I examine the neurocentrism prevalent in neurodiversity to show that overemphasis on the brain results in a problematic mechanisation of lived experience and a bestialisation of neurodivergence (2). These first two sections evidence the need for a more-than-human and more-than-neurological turn in neurodiversity studies. Taking ethology as a new starting point to engage with the life sciences in neurodiversity studies, I introduce the concepts of ethodiversity and ethodivergence, which I elaborate on by drawing on insights from conservation biology and philosophical ethology (3).

## From biodiversity to neurodiversity: Anthropocentrism and the exclusion of nonhuman animals

For a long time, the invention of the term “neurodiversity” was attributed to and claimed by Australian sociologist Judy Singer, one of the core figures of the field of neurodiversity studies and of the neurodiversity movement. Singer, herself “in the middle of three generations of women somewhere on the autistic spectrum” (Singer 2020), is the daughter of a Jewish survivor of Auschwitz, from whom she received her political sensibility for the inclusion of the marginalised and the promotion of human rights, and to whom she links the inspiration of her work on neurodiversity (Singer 2023b).

Only recently, this attribution of the term “neurodiversity” to Singer was proved inaccurate and a collective origin within the *Independent Living* (InLv) online community was evidenced (Dekker, n.d.; Botha et al. 2024). While correcting the misattribution of the term is a major step forward for neurodiversity studies, the cultural prominence from which Singer’s work has benefitted, perhaps in part due to this misattribution, makes her writings important to the field’s history.

As I hope to demonstrate here, the terminological proximity between “biodiversity” and “neurodiversity”, which was put forward by Judy Singer in her Honours dissertation from 1998 (2016), conceals an ambiguous relationship between neurodiversity studies and the life sciences, characterised by a rather superficial engagement. In a text published on her blog, Singer describes neurodiversity as “a biological truism that refers to the limitless variability of human nervous systems on the planet, in which no two can ever be exactly alike due to the influence of environmental factors” (Singer, n.d.). Singer’s description of neurodiversity, while more explicitly engaged with biodiversity than is often the case in the neurodiversity movement, constitutes a relatively standard understanding of neurodiversity as a form of biodiversity.

While Judy Singer did not coin the term “neurodiversity” and while her views on neurodiversity are not representative of the field of neurodiversity studies, critically engaging with her work can help us explore the early history of the neurodiversity lexicon and particularly its relation to the life sciences. Drawing on this case study, my endeavour with this section is to highlight the risk of anthropocentrism and biological determinism we run when taking the analogy between biodiversity and neurodiversity too lightly.

The Convention on Biological Diversity (n.d.) defines biodiversity as “the variability among living organisms from all sources [...] and the ecological complexes of which they are part; this includes diversity *within species*, between species and of eco-

systems” (emphasis mine). Given the inclusion of intraspecies diversity in the definition of biodiversity, one might wonder how neurodiversity differs from biodiversity. Considering that nervous systems constitute only a part of life forms, and only of *some* life forms – namely the vast majority of animals – neurological diversity appears to be a subset of biological diversity.

Judy Singer explicitly acknowledges this, yet she misses the mark by excluding nonhuman animals from this subset. While she explains that “Neurodiversity is a subset of Biodiversity” (Singer, n.d.), she suggests that “just as Biodiversity refers to ALL the species [...] Neurodiversity refers to ALL Humans” (Singer, n.d.). Strangely, Singer’s concept of neurodiversity does not include all animals endowed with a nervous system but *human* animals only and describes a form of biodiversity without nonhuman animals. In this way, it champions a form of anthropocentrism.

Key to this anthropocentrism is Singer’s idea that “just as Biodiversity was coined for a political purpose, to advocate for the conservation of the environment, I intended [sic] the term Neurodiversity specifically for an advocacy purpose” (Singer, n.d.). Indeed, in her dissertation, Singer (wrongly) claims to have created the neurodiversity concept, but not the neurodiversity movement; at that time, the latter was already emerging within the InLv community. In fact, Singer’s contribution was at best to offer an academic and intellectual investigation of the burgeoning movement from a sociological perspective.

Had the neurodiversity concept emerged in closer connection to biodiversity science or within environmentalist and animalist movements, its definition would likely have been very different. Indeed, since “biodiversity” was coined to preserve the diversity of life forms on planet Earth (Haila 1999; Takacs 1996), “neurodiversity” as its subset would supposedly have given itself the aim of preserving the diverse modes of functioning of all nervous systems. However, the neurodiversity movement had a different agenda, and the analogy between biological and neurological diversity reflects this political horizon. The neurodiversity movement often relies on the human rights approach. It takes ‘recognition’, “civil rights and end to discrimination”, and “disability services appropriate to their level of functioning on the spectrum” as its main goals (Singer 2016, 55). These goals are clearly not reducible to conserving a diversity of neurological systems understood as part of specific life forms. This discrepancy explains why “literally, the term [neurodiversity] refers to all beings with a nervous system, but since I coined it [sic] for a human rights advocacy purpose, I limited it to Homo Sapiens. The term Biodiversity covers the rest” (Singer, n.d.).

By distinguishing the human, deserving of rights (e.g., recognition, civil rights,

disability services, etc.) and the environment, deserving of conservation only, Singer excludes nonhuman animals from the sphere of the political discourse of neurodiversity. Her writings anchor the theoretical conception of neurodiversity in a set of dualisms (nature/culture, animals/humans, science/politics). That such dualisms existed in implicit, non-theoretical forms within the nascent neurodiversity movement could be excused. But Singer not only echoes them, she reclaims them and attempts to justify them theoretically. As neurodiversity scholar Sam Fellowes notes, the idea “that only forms of human diversity matter, therefore neurodiversity does not cover animals [...] seems arbitrary” (Fellowes 2022). Indeed, following Singer’s description, it seems that to preserve nonhuman neurological diversity, one should probably invest time and energy in the environmentalist rather than the neurodiversity movement.

Curiously, Singer (just like the neurodiversity movement) does begin with biodiversity and takes it as the explicit foundation of the concept. Perhaps engaging with these biological roots more deeply could be of interest were neurodiversity to take a more-than-human turn. For instance, biodiversity research centres on environments and species rather than beings or individuals alone. It bridges the nature/culture dualism by insisting on the role of environmental factors on animal and human lives. Singer’s description of neurodiversity, as we have seen, mentions environmental factors as causes of human neurodiversity. There are clear overlapping patterns at play, but they are not explored by Singer or neurodiversity studies: the political horizon of the movement – which, I insist, is nothing short of a matter of life and death – somehow prevents the neurodiversity movement and neurodiversity studies from further engaging with their biological roots.

Indeed, both in the scholarship on neurodiversity and in the cultural and activist work done within the neurodiversity movement, animal neurodiversity and neurodivergence are almost non-existent. In a blog article, vegan neurodiversity scholar Sam Fellowes asks: “Should neurodiversity be extended to animals?”. After critiquing several arguments opposed to such extension, he concludes “that a neurodiversity advocate needs either give reason to restrict neurodiversity [sic] to humans or should extend it to animals” (Fellowes 2022).

Stances like the one Sam Fellowes takes in his blog are rare in the field. While it is not uncommon to hear about the special bond formed between neurodivergent humans and nonhuman animals, this rarely points to *nonhuman* or *animal* neurodivergence. Yet, most accounts of animality in neurodiversity offer descriptions of how nonhuman animals benefit neurodivergent humans, as ‘emotional support’ animals or guides towards a better understanding of human sociality. In doing so, they fail to chal-

lunge the distinction between humans and animals and the incorporation of the latter into the speciesist view of nature as a resource, object, or background for human action. Ironically, animal neurodivergence seems to be getting a better shot at recognition in the medical sciences than neurodiversity studies, with animal psychiatry starting to look at autism- and ADHD-like in domestic animals (González-Martínez et al. 2024).

Surely, beyond its anthropocentrism, the human rights approach of the neurodiversity movement has been quite successful in raising awareness about neurodiversity and fostering changes in education and workplaces for neurodivergent humans (Chapman 2024). The close connection between the neurodiversity movement and disability rights movements has played a critical role in this. Neurodiversity studies has also benefitted from the social model of disability, which posits that disability does not come from innate individual deficits (as posited in the medical model) but from disabling social and material structures and institutions (Oliver 1990; Shakespeare 2006). The social constructionist understanding of oppression, focused on the social, sometimes at the expense of the biological, has faced growing criticisms and challenges (Garland-Thomson 1997; Shakespeare 2006).

In that context, disability studies and feminist scholar Rosemarie Garland-Thomson, known for her engagement with the social model of disability, develops a concept of disability through a biodiversity lens. Garland-Thomson presents disability as a set of benefits rather than deficits, which she deems “inherent to the human [...] condition” (2013, 339). In doing so, she provides anti-eugenic arguments in favour of “conserving disability”. Again, it is noteworthy that a supposedly *human* condition emerges from this description, even though the diversity that is described could easily be observed in nonhuman animals.

In another paper, Garland-Thomson (2015) explicitly defines disabilities as “persistent forms of human biodiversity”. She adds that “for humans to thrive, we need to be ensconced in an environment that sustains the particular form, function, and needs of our bodies” (2015, 13). Although she develops a model that lies somewhere between the social constructionist approach and a materialist approach, animals are backgrounded. Here again, biodiversity serves as a foundation to engage with human – and only human – affairs. The notion that to thrive, one needs an environment adapted to one’s bodily dispositions and one’s evolutionary or ethological predicates, while true for humans, applies equally to nonhuman animals.

While current scholarship on the intersection of animality and disability has shed some light on the possible applications of the disability category to nonhuman animals (Ray and Sibara 2017; Taylor 2016), there is no equivalent for neurodiversity. This mat-

ters because even though neurodivergent life can and often *does* include elements of disablement, the neurodiversity concept is not exhausted by the notion of disability. Neurodiversity, because it encompasses the sum of the differences between nervous systems, describes a largely ‘natural’ part of human existence which is “morally neutral”, according to Judy Singer (n.d.).

Neurodiversity does not only relate to disabling experiences: while neurodivergence can result from psychological trauma, deep neurological injury, or neurodevelopmental conditions, it can also be the result of intense consumption of hallucinogens or long-term meditative practices, which are not always debilitating (Walker 2021). Singer reminds us, and rightly so, that “neurodiversity” as a concept does not mean ‘neurological disability’ (Singer, n.d.).

In light of these differences, Singer explicitly positions her thinking within a reasonable distance from the social model of disability, which she suggests makes a mistake when denying a role to biology. But still, Singer is wary of essentialism and aims to find a balance between social constructionism and biological determinism (Singer 2016, 3840). Specifically, she rejoices about the recent “developments in the biological sciences” (Singer 2016, 40), including “neurology” and “evolutionary psychology” (Singer 2016, 27), a movement now largely criticised for its tendency to naturalise the social structures of oppression. For instance, Singer wonders whether “a propensity for stigmatisation has adaptive value and is ‘hardwired’ into the human organism” (Singer 2016, 39).

Unlike many in neurodiversity studies, Singer attempts to integrate the life sciences into her (anthropocentric) politics. Singer, who has been touting her progressivism for decades, has recently marked the history of the neurodiversity movement when, during the summer of 2023, she made a very public transphobic and conservative turn. In comments posted on Twitter, she used alleged biological differences to justify refusing to call trans women “women” and suggested using the term “Trans Femoid” instead (Singer 2023a). By appealing to biology in such a naïve and naturalised way – remember Singer’s idea that neurological diversity is a “biological truism” – aren’t we in danger of using it in the worst possible way?

While Singer’s use of biology and particularly biodiversity remains marginal and while her impact on the neurodiversity movement or neurodiversity studies should not be overstated, the problems her writings exemplify are not out of the ordinary. Indeed, a similar issue is at stake in neurodiversity’s engagement with neurology.

## From neurology to neurodiversity: Neuroreductionism and the bestialisation of neurodivergence

The neurodiversity concept was developed in the late 1990s, primarily for political reasons, and initially centred on autistic advocacy. In this context, the neurological approach developed in the 1960s as a response to the way autism was being described in medical terms at the time (Rimland 1964). Indeed, the autism concept was coined by Eugen Bleuler, a Swiss psychiatrist who took up and transformed Freudian “auto-eroticism” (Bleuler 1950). For Bleuler, autism was not a psychiatric syndrome in its own right, but a symptom of schizophrenia. Later, autism was described in psychoanalytical terms as the result of the coldness of so-called “refrigerator” parents, most often mothers (Kanner 1943; Bettelheim 1967). The rise of neuroscience in the late twentieth century led to its reconceptualisation as a “neurodevelopmental disorder”, a kind of disorder that becomes visible and effective during childhood in relation to the development of the nervous system. This anchoring of autism in neurology also opens the way to the idea of hereditary, genetic transmission.

Although Singer disagrees with the pathologisation of autism, she suggests that this paradigm shift towards neurobiology within the medical sciences was a good thing for autistic people. For instance, she rejoices, in the published version of her Honours dissertation, over autism being newly identified as a “‘hardwired’ neurological difference, not a personality flaw” (Singer 2016, 9). In her desire to anchor autism in the stability of neurogenesis, away from the pathologising regimes of psychoanalysis and behaviourist therapy, Singer somehow contributes to the representation of autism as a hardwiring of the brain. In my view, this notion has regrettably become all too common in the autistic community: it is not uncommon for autistics to explain their neurodivergent traits or experiences of disability by saying “my brain is just wired that way” (Able Magazine, n.d.; Melina 2023; Slaton 2021). It is as if no environmental conditions or subjective intentionality came into play, as if to state the nature of the processes in your brain exhausted the description of the behaviour or experience in question.<sup>1</sup>

However, it is not certain that neurodivergence always refers to neurological wiring. While neurodiversity originally focused on autism – which, as of today, is considered a neurodevelopmental condition – it now includes a range of hereditary and acquired forms of being-in-the-world, such as ADHD, dyslexia, depression, Tourette

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1 For a more thorough analysis of the role of self-pathologising (particularly through the use of non-innocent metaphors) in the situated knowledges of autism, see Tarragnat, forthcoming in 2025b.

syndrome, Down syndrome, and obsessive-compulsive disorder. Even though some of these forms of neurodivergence have a mainly social or environmental aetiology, the concept of neurodivergence is still used, literally referring to a *neurological* divergence. Behind this neurocentrism – the emphasis on the neurological level – it is rare for a precise examination of the neurological dimension of these neurodivergences – particularly acquired ones – to be put forward scientifically. One exception may be found in the intense world theory, partly devised by autistic people and based on neurobiological data.

So while the neurodiversity movement and paradigm propose to depathologise autism and other neurodivergences, their reduction of neurodivergent experiences to brain wiring constitutes a form of neuroreductionism. The idea that my brain's particular wiring simply enables or prevents me from carrying out certain tasks, or that it exhausts the description of the lived experience of autism, depression, or obsessive-compulsive disorder, is tantamount to denying the role of the individual's social context and subjectivity in the expression of their neurodivergent traits. According to philosopher of ethology Vinciane Despret, not only does reductionist determinism confiscate subjectivity and freedom, but it also – and perhaps more problematically – confiscates responsibilities and skills, which are core elements of the social and political negotiation of “relational life” (Despret 2021, 47–48, my translation).

To be clear, neither Singer, nor most neurodiversity scholars ever intended for neurodivergence to be understood through the lens of biological determinism (Singer 2016, 40). Autistic researcher Nick Walker explains that this use, which is pathologising, is at odds with the neurodiversity paradigm and thus constitutes a “commonplace” misreading on the part of neurodivergent people (Walker 2021, 55). Yet when I see the prevalence of neuroreductionist discourses in neurodivergent communities, I can't help thinking that the problem lies, at least partly, in an insufficient theoretical construction within neurodiversity studies.

In my view, there are several explanations for the pervasiveness of neurocentrism in neurodiversity studies and the neurodiversity movement. On the one hand, there is a kind of lock-in effect, whereby the repetition of a certain type of discourse or practice makes attempts to break out of it or to develop alternative discourses and practices increasingly difficult. On the other hand, progressive political movements have historically had a complicated relationship with the sciences, based on a fear of essentialism. Biology has indeed been used to develop classist, sexist, racist, ableist, and speciesist ideologies, among others, and there are good reasons to remain suspicious of it.

Indeed, the focus on neurology often implies proximity to, if not complicity with the biological discourses of neurology and the sciences of autism, whose priorities lie less in the acceptance of neurodiversity than in the formulation of new treatments to ‘cure’ neurodivergent individuals. In the context of psychiatry, the paradigm shift from psychoanalysis to neuroscience needs to be assessed in a nuanced way. Admittedly, psychoanalysis was pathologising and the advent of neuroscience made it possible to avoid this specific mode of pathologising. But does this mean we should give this new paradigm a blank cheque, an agreement in principle?

I am wary of the hegemony of the regime of physicochemical explanations, which early twentieth-century theoretical biologists already critiqued for its reductionism of explanation, as opposed to the hermeneutical power of understanding.<sup>2</sup> If it is true that *explanations* of autistic neurology can shed light on autistic sensory perception, emotional mechanisms, or behavioural patterns, a proper *understanding* cannot occur without accounting for the lived experience of these patterns and affects.

The problem with the prevalent neurocentrism in neurodiversity studies is that it often dehumanises neurodivergent humans at the same time as it animalises non-human animals.<sup>3</sup> Indeed, it comes dangerously close to the risky territory of mechanistic thinking, which, from Descartes on, reduced animals – human and nonhuman – to machines animated from the outside. While Descartes argued that humans possessed a soul and animals didn’t, generating a set of dualisms (animal/human, body/mind, *res extensa/res cogitans*), he never managed to correctly explain the articulation of mind and body in the human. Consequently, his mechanistic understanding of embodiment has pervaded biology until today, so much so that neurocentrism sometimes works to turn neurodivergent people into less-than-subjects, and specifically into machines. Neurodivergent actions and experiences, rather than resulting from an agential and (at least minimally) intentional negotiation with one’s environment and one’s situation – something that is reserved for neurotypical humans – are understood as being triggered by external stimuli of a physical or chemical nature. While describing brains and neurological phenomena, neurocentric conceptions indeed tend to reduce neurodivergent experience and behaviour to their physicochemical explanations. It is as if they constituted pieces in a larger mechanism: the individual’s pathology.

Like the scientific devices set up to study animals, the rhetorical device of neuroreductionism makes neurodivergent people stupid [*bêtes*]: it bestialises them (Despret

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2 We owe the genesis of this important philosophical distinction to Wilhelm Dilthey. See Makkreel 2021.

3 For an analysis of the entanglement of dehumanisation and speciesism, see Crary 2021.

2016).<sup>4</sup> Their lived experience is described as so foreign and ungraspable that one is justified in wondering whether it exists in the first place. Neuroreductionism, in brief, deprives neurodivergent humans and nonhuman animals of their intentionality. For this reason, Remi Yergeau notes that “involuntarity [...] has come to rhetorically typify the life of the neuroqueer” (Yergeau 2018, 58), to which we might add “the animal”.

In their essay “Against neuroreductionism”, Erin Manning and Brian Massumi (2013) argue that “beginning and ending the conversation with brain states sideline problematics of a kind that might be considered phenomenological – where the field of immediate experience is always-already subjective” (n. p.). Moreover, they suggest that “the neuro is inherently a therapeutic concept contrived with and for the pathological”, a tool that is ill-fitted for the political advocacy purpose behind neurodiversity studies and the neurodiversity movement. Therefore, in their view, “the neuro remains profoundly *neurotypical*.”

Manning and Massumi’s point helps us understand the harm neurocentric conceptions have done to individuals whose divergence is not neurodevelopmental. Acquired neurodivergences, such as depression and anxiety, which are explicitly acknowledged and embraced by the coiner of the term “neurodivergence”, Kassiane Asasumasu (2016), are all too often discarded in favour of neurodevelopmental divergences, such as autism and ADHD, or are reduced to their physicochemical dimension. Attempting to treat depression only with chemicals is to miss the social and psychological dimensions at hand and exert a form of reductionism.

Manning and Massumi explain that the distinct “mode of existence” (Manning and Massumi 2013) characteristic of autism, to take one example, differs from that of allistics (i.e., non-autistics). It is characterised, among other things, by “autistic perception” (Manning 2013, 2016). According to Manning, autistic perception can be defined less by a utilitarian outlook on the world – which belongs to the neurotypical – than by a transversal and non-segmented perception of environmental fields. Eventually, for Manning and Massumi (2013), this difference asks “an *ecological* question concerning how diversities co-inhabit the same field of becoming-human” (emphasis in original). In the context of more-than-human divergence, I agree with Manning and Massumi about the importance of beginning with lived experience, which implies complex forms of becoming-animal and being-in-the-world.

If neurocentrism too often operates in a *neurotypical* way, it might be because it fails to find the balance between the stability and certainty of the innate and the com-

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4 In French, “bête” means both “beast” and “stupid” – this says a lot about the construction of the “animal” in European modernity.

plexity and contingency of the acquired. Therefore, it fails to acknowledge the queer and subversive potential for difference held in contingency, in the ecologies of perception and movements that characterise lived experience.

While I am sympathetic to Manning and Massumi's arguments against neuro-reductionism, it is important to bear in mind that scientific paradigms do not have any ethical or political value in themselves, but are epistemological tools used to advance sometimes antagonistic political interests. Never fundamentally innocent or guilty, liberating or conservative, they adapt to the dominant logic of their field and the uses to which they are put. In the medical and psychiatric field, it seems clear that the curative horizon is and will remain central, but can we not recover and subvert some of the field's concepts?

It is not part of this paper's scope to examine the ways neurodiversity studies could subvert neurobiological accounts through neuroqueer theory (Tarragnat, forthcoming in 2026), neurofeminism, or contemporary evolutions in the science of neuroplasticity. For now, suffice it to say that rather than advocating for a complete rejection of neuroscientific perspectives in neurodiversity studies, I am calling for a more-than-neurological turn. Neurobiological accounts, if they are to be preserved in the discourse of neurodiversity, should be decentred.

On the one hand, we need to recognise that neurology encompasses not only the brain, but our entire nervous system, central and peripheral, including its autonomic, somatic, and visceral parts. What's more, to talk about neurology *better*, it is sometimes necessary to talk about it *less*. New descriptions and figurations of embodied difference are needed to highlight the diversity of forms of being-in-the-world: neuro-logical, cognitive, emotional, somatic, ethological, etc. Decentring neurology may require other prefixes than "neuro-", like "etho-", which stems from ethology.

### **From neurodiversity to ethodiversity: Ethology and the reclamation of behavioural difference**

Ethology, the scientific study of behaviour in nonhuman and human animals, is interested in describing the various forms of being and behaving of different species and formulates species-specific accounts of what it means to be and behave like humans, cats, bats, whales, robins, etc. Thus, ethology can provide a foundation to explore the diversity of modes of being-animal and the proximities and differences between species, communities, and individuals.

Like the neurosciences, ethology encompasses a diversity of epistemological regimes, each presenting distinct conceptual and political challenges. First developed in conversation with behaviourism, ethology adopted a rather mechanistic and reductionist understanding of animal-being. Jakob von Uexküll, whom I start with (Tarragnat, forthcoming in 2025a), developed a theoretical biology which could be understood as proto-ethological. In his *Forays into the Worlds of Animals and Humans* (2010), Uexküll focused on behaviour as the harmonious coordination of perception and action aiming to meet the organism's needs. While Uexküll was one of the first biologists to provide a subjective conception of animals – thus avoiding traditional physicochemical reductionism – he formulated a rather minimal conception of subjectivity which mostly excluded the psychological and intentional level.

To this extent, his theory received praise from behaviourists, who focused solely on observable data and did not consider mental states. Autism conversion therapy, officially called Applied Behavioural Analysis (ABA), which behaviourists regard as the only effective clinical treatment of autism, operates by imposing repeated prosocial behaviours onto autistic patients (Yergeau 2018, 96). Furthermore, behaviourism has long been an essential tool for training domesticated animals and developing zootechnical systems (Fernandez and Allison 2021).

Considering the troubling history of ethology and its relation to behaviourism, what motivates me to suggest ethology as a starting point to generate a more-than-human and more-than-neurological turn in neurodiversity studies? First, alternative approaches to behaviour can facilitate a more productive engagement with ethology. For instance, Merleau-Ponty's *Phenomenology of Behaviour* (1963) famously defines behaviour as emerging from particular situations – specifically, from environmental or ecological worlds mediated by embodied subjects. Thus, rather than being a mechanistic succession of observable movements, behaviour possesses “a physical side that indicates something psychic appresentatively” (Husserl 1999, 114/144).

By adopting a phenomenological approach to ethology, I argue that behaviour, which encompasses both external observations and internal experiences, can be reclaimed beyond the confines of behaviourism. In this phenomenological ethology, behaviour allows us to redirect our attention away from the fixity and simplicity of neuroreductionism and toward the contingency and complexity of our lifeworlds.

The centrality of behaviour in neurodiversity is easily understood: it is not so much the observation of our differing neurology that leads neurotypicals and society to marginalise and exclude neurodivergent individuals, but rather the observation of our distinct behaviours and the unique ways in which we exist in the world. Similarly, people

often start wondering whether they might be neurodivergent based on the observation that we *behave* and *exist* differently than others, or that we struggle to perform socially expected behaviours (like eye contact, small talk, etc.).

Psychogenic models of autistic aetiology have largely fallen out of favour, making it increasingly unthinkable to discuss autism without considering neurobiological data. However, in light of the challenges presented by neuroreductionism, we might benefit from a third way between environmentalist views – whether behaviourist or psychoanalytical – and neuroreductionist ones. While the aetiology of autism is largely understood to be neurogenic, an ethological approach could help us emphasise the behavioural nature of neurodivergence in its complexity.

In this context, I offer the concept of ethodiversity, short for ethological diversity, which refers to the intra- and inter-specific variabilities and differences in behavioural or existential styles in (human and nonhuman) animals. Ethodiversity encompasses biological (including traditional ethological) needs, behavioural patterns, existential orientations, affects, as well as inter- and intraspecific relationality. As such, it refuses to separate the innate from the acquired or the inside from the outside.

Moreover, different species exhibit distinct ways of being and behaving, and these differences also occur within species. Indeed, like neurodiversity, these differences can also be individual. As Singer explains, “no two [nervous systems] can ever be exactly alike due to the influence of environmental factors” (Singer, n.d.). But even in this sea of difference, categories emerge which help us make sense of our experiences and resist oppression. Autism, ADHD, Tourette syndrome, depression, Down syndrome, are examples of categories which encompass large spectra of differences while gathering individuals around shared traits.

The issue at hand, just as within biodiversity, is thus a matter of classification. Ethology defines species-specific behavioural repertoires, and the question remains of whether the species level is still the most relevant scale of analysis. Dog breeds are just one example of such intra-species biological and ethological diversity. I contend that neurodivergences, as we increasingly refer to them, are similarly complex. More so, as philosopher Lori Gruen suggests in a conference presentation on disability and animality, “the concept of species is not simply biological or naturally given, and the related notion of species-typical behaviour or functioning does not pick out necessarily immutable traits or characteristics, although judgements about these behaviours or characteristics are based in part on evolved biological capacities” (Gruen 2022). In other words, the species category and the idea of *species typicality* tend to crystallise an ableist understanding of normalcy in the sense that it constitutes “a projection of an essential

capacity or essential characteristics” (Gruen 2022). In referring to ethological descriptions of species typicality here, I thus acknowledge, with Gruen, the tension between the informative nature of species categorisations and the risk of ableist essentialism.

By extension, ethodivergence refers to ways of being and behaving that depart from the behavioural patterns (1) dominant in one’s species, (2) in one’s ecological and social milieu, and/or (3) imposed by anthropocentric ethonormativity – understood as the normative regulation, based on humanist principles, of the behaviours which can (or cannot) be accepted in given animals (human or nonhuman) in specific contexts. Just like neurodivergence, which is often but not always linked to disability, ethodivergence may enable unique forms of flourishing but can also lead to vulnerability or debilitation. Moreover, while some ethodivergences arise from selective pressures, others could be understood as effects of intraspecies and multispecies relationality or debilitating environments. Examples such as climate change (Gunn et al. 2021), the breeding and confinement of farmed animals (Coria-Avila et al. 2022), and anthropogenic changes in animal habitats (Beckman, Richey & Rosenthal 2022), illustrate situations that may hinder the expression of behavioural patterns dominant in one’s species or one’s ecological or social milieu.

Moreover, ethodivergent beings often counter the humanist behavioural norms *imposed* or *expected* from one’s species or community in a given context. Consequently, they tend to face debilitating ethonormative violence: horses who refuse to obey their riders and depressed or fearful cats who resist being petted and may even attack humans are often abandoned or euthanised. Similarly, humans with Down syndrome are more likely to be aborted after detection through prenatal screening (Leporrier et al. 2003).

In other contexts, such as science laboratories, zoos and circuses, which involve animal captivity, the behavioural norms imposed on animals rely on anthropocentric goals, such as human entertainment or knowledge production. In such situations, animal subjects are asked questions which are not always meaningful ethologically speaking (Despret 2016). While the behavioural repertoires expected from these animals could be deemed atypical at the species level, they are technically typical in the context of the animal industrial complex and its systemic violence. Whether ethodivergence here consists of the expected behaviour itself or in the ways animals resist ethonormativity is debatable. Anyways, the loss these animals experience because of the violence could be described, with Sunaura Taylor, as “captive disability” (Gruen 2025). Besides, a relation to neurodivergence could be perceived in the paralleling nature of autistic stimming and animal stereotypies (Yasmeen et al. 2022).

While I came to the concept of ethodiversity independently, it was coined by

Adolfo Cordero-Rivera (2017) in the context of ecological and evolutionary sciences. Cordero-Rivera defines ethodiversity as “*the variability of behavioral traits in the biological hierarchy, including the individual level (for example personality), the population level (for instance alternative reproductive strategies), and the ecosystem level (like contrasting behavioral patterns between species)*” (2017, 2, italics in text).

Before Cordero-Rivera, two other researchers from the field of conservation biology, Tim Caro and Paul W. Sherman (2012) argued for incorporating behavioural diversity as part of biodiversity, albeit only at the species and population levels. Cordero-Rivera introduces the individual level and distinguishes between functional diversity – defined as “a measure of species interactions and relative importance in the community” (2017, 2) – and behavioural (or ethological) diversity – which does not need to contribute to maintaining the equilibrium of the community or ecosystem to warrant preservation. Building on their work, I offer the concepts of ethodiversity and ethodivergence to describe modes of being, behaving, and inhabiting the world that are valuable to protect.

Examples of ethodiversity include the diversity of “human languages” (Cordero-Rivera 2017, 4), migratory strategies (2017, 3), and patterns of nocturnality and diurnality (2017, 3). These differences can be explained by local adaptation in the evolutionary sense, a long-term process due to its genetic component, but also by learning, which occurs much more rapidly. In this context, ethodiversity is directly related to ethodivergence: for instance, only 2% of American dippers switch migratory strategy over their lifetime (2017, 3). Additionally, in north-western Spain, “freshwater snakes (*Natrix maura*) go to seashore pools to capture marine fish (Galán, 2012), a behavior which [...] is rarely reported for the species” (2017, 3).

Cordero-Rivera asserts that “ethodiversity is expected to be related to biological complexity [...] An increase in species richness will obviously be positively related to ethodiversity, simply because more species also mean, generally, greater phylogenetic diversity” (2017, 4). Similarly, sexual selection is described as “a powerful force in evolution, which has produced and maintains many of the most extraordinary behaviors” (2017, 4). This suggests that ethodiversity may be “positively correlated with the intensity of sexual selection” (2017, 4). This aligns with Elizabeth Grosz’s (2011) argument in *Becoming Undone: Darwinian Reflections on Life, Politics, and Art*, which posits that while natural selection perpetuates sameness and adheres to the logics of functionality and fitness, sexual selection acts as the affective motor of difference in animal life, fostering innovations in art, culture, and politics.

Consequently, Cordero-Rivera notes that “ethological differences may contribute or even predate speciation, and be the main process generating cryptic species, like

crickets or birds only differentiable by male songs” (2017, 3). In this context, the new conception of ethodiversity and ethodivergence I am offering is grounded in what I call a philosophical ethology, along with Vinciane Despret (Buchanan, Chrulew, and Bussolini 2019) and Roberto Marchesini (Bussolini, Buchanan, and Chrulew 2019) – which examines animal subjectivity and animal ontology. This perspective posits that animal-being serves as the ontological foundation for ethodiversity and ethodivergence, because animals (rather than plants or physical objects) express themselves through subjective behaviours that are diverse and change over time. In this framework, desire is key to the phenomenology of animal-being (Marchesini 2023). In turn, ethodivergence, which produces new behaviours, constitutes one of the core mechanisms of difference and becoming within the ontology of animality.

## Conclusion

With this paper, I have called for a more-than-human and more-than-neurological turn in neurodiversity studies. By examining neurodiversity studies’ relationship to its biological roots – specifically biodiversity and neurology – I have questioned its problematic tendency to rely on biological truisms. This is explicit in Judy Singer’s definition of neurodiversity, but this is just as prevalent in the neuroreductionist accounts that run through the neurodiversity movement. Indeed, something is disturbing in the ease with which the neurodiversity movement seizes on scientific concepts drawn from biology to formulate an understanding of neurodiversity supposedly devoid of any scientific pretence. This, I suggest, paves the way for reductionist and essentialist accounts of neurodivergence, which are detrimental to neurodivergent humans and nonhuman animals alike. While aiming to cut (human and nonhuman) animality out of the picture of neurodiversity, this reductionism bestialises neurodivergent humans, reinforcing age-old humanist rhetoric of animality.

Neurodiversity’s ambiguous engagement with the life sciences (and with animality), I suggested, stems from its anthropocentric political horizon, which creates a tension, if not even an opposition, between the biological and the political. On the contrary, I called for renewed attention to the biological roots of neurodiversity as a way to bring forth more accountable knowledges on neurodiversity and neurodivergence. Reclaiming (our) animality as a core component of neurodivergence and its lived experience can help us shed new light on what it is, exactly, that differs between neurotypical and neurodivergent people: neurocognitive processes, certainly, but also behavioural and somatic repertoires, affective styles, etc. This move back to the biological

also helps us imagine a more-than-human neurodiversity studies in which nonhuman animals might play a role, even though the political applications of neurodiversity for antispeciesism and animal rights might not be immediately evident.

Admittedly, this paper has been more interested in the kind of engagement with the biological sciences a more-than-human turn in neurodiversity studies calls for than in the kind of politics it might involve. Besides exposing and critiquing the anthropocentrism of the neurodiversity paradigm (particularly in Judy Singer's work), I have not fully sketched out why such a more-than-human turn mattered for nonhuman animals themselves and how they could benefit from it. All these questions are important and deserve close attention. In a forthcoming piece, I explore some of the questions raised by the intersection of neurodiversity and animality in a posthuman world, including at the political scale.

Besides, while this paper centres on neurodiversity at large, most of the examples I examined here relate to autism specifically. It is well-known that the neurodiversity movement and neurodiversity studies first developed in connection with autism (Silberman 2015) and through the work of autistic individuals. The observations and the theoretical framework I offered here stem from this historical context and my belonging to the autistic community. While I do not feel fully qualified to speak on other neurodivergences, I acknowledge that this is a limitation and that the contribution I made here – especially in the last section of the paper on ethodiversity and ethodivergence – might not apply to all neurodivergences equally. Nonetheless, given the broad and encompassing nature of ethodiversity as a concept and phenomenon, I hope that it can be applied and adapted to serve the interests of most.

Finally, while I offer ethology as the new starting point for neurodiversity discourse, I do not claim it is the only viable alternative. Instead, I suggest that ethology, particularly in its philosophical and phenomenological forms, offers a compelling counterpoint to the anthropocentrism and neuroreductionism prevalent in much of current neurodiversity discourse and activism. Moreover, ethology is central to my aim of reclaiming animality as an essential dimension of neurodiversity and neurodivergence. In a similar way, philosopher of disability and madness Virgil Murthy is looking at affects as the site of a particular form of ableist normativity towards mad people, introducing the notion of emoatypicality (Green 2024). Thus, in introducing ethodiversity, I am not suggesting we abandon neurodiversity studies and start over. Rather, I am calling for a radical expansion of our perspective. By introducing ethodiversity, I am trying to take a first step towards this broader, fairer, and more inclusive neurodiversity studies.

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