Biases in Niche Construction

Felipe Nogueira de Carvalho (Postdoctoral researcher in Philosophy, Universidade Federal de Minas Gerais. felipencarvalho@gmail.com. Orcid: https://orcid.org/0000- 0002-0584-3424)

Joel Krueger (Associate Professor in Philosophy, University of Exeter. j.krueger@exeter.ac.uk. Orcid: https://orcid.org/0000-0003-0931-1596)

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Abstract: Niche construction theory highlights the active role of organisms in modifying their environment. A subset of these modifications is the developmental niche, which concerns ecological, epistemic, social and symbolic legacies inherited by organisms as resources that scaffold their developmental processes. Since in this theory development is a situated process that takes place in a culturally structured environment, we may reasonably ask if implicit cultural biases may, in some cases, be responsible for maladaptive developmental niches. In this paper we wish to argue for an affirmative answer. In order to do so, we first propose to conceptualize implicit bias as embodied perceptual habits, and then proceed to show that these habits are at least partially responsible for maladaptive developmental niches of children with Down syndrome and autism. With this framework we thus hope to bring together two fields of research that haven't been explicitly connected: implicit bias and niche construction theory. Linking these two theories may bring benefits both to implicit bias researchers, who can extend this concept to characterize other sets of processes as biased, as well as to niche construction theorists, who will have a useful theoretical tool to diagnose maladaptive features of niches brought about by sociocultural biases.

Keywords: niche construction theory; implicit bias; embodied perceptual habits; developmental niche; autism; Down syndrome

Introduction

Recent approaches to cognition in philosophy of mind and cognitive science have shifted the focus from what goes on inside the head of individuals to the ways in which environmental resources are recruited in order to augment cognitive capacities (Clark & Chalmers, 1998; Menary, 2007; Rowlands, 2009; Sterelny, 2010). These approaches, broadly construed as "4E Cognition" (embodied, embedded, enactive, and extended), found a powerful ally in a framework coming from philosophy of biology and the biological sciences known as niche construction theory, which stresses the active role of organisms in modifying their environment and the impact of these modifications on the selection pressures that act upon them (Laland et al., 2000; Odling-Smee et al. 2003).

Some developments in niche construction theory, however, did not focus on selective pressures per se but on what became known as the *ontogenetic niche*, or the set of ecological, epistemic, social and symbolic legacies transmitted to the next generation and inherited by developing organisms as resources that guide and scaffold their own developmental processes (Stotz, 2010; West & King, 1987). In this framework, the concept of the developmental niche arises as a theoretical tool designed to capture how development is a situated process, which takes place in an environment structured by constraints and opportunities provided by the cultural community in which it occurs (Gauvain, 1995; Super & Harkness, 1986).

But if the environment in which development occurs is culturally structured, the construction of developmental niches must be influenced by local customs, beliefs and assumptions about child care, which bias processes of niche construction in certain directions. But of course, to say that a process is "biased" is not to evaluate it in a negative light. Since the function of a developmental niche is to enable children to grow into competent members of their communities, it is expected that each culture will have its own sets of values and belief

systems through which cognitive skills and developmental achievements of children are interpreted. For example, in cultures where babies are carried on their mother's backs most of the day, such as the Kipsigis in Kenya, crawling behavior emerges later than in cultures where babies are encouraged to freely explore their environment, such as in middle-class North American families (Super & Harkness, 1982). We could thus say that sociocultural habits bias the development of crawling behavior, but since early crawling behavior is not particularly important for the Kipsigis this is not a problem for them, and it would not be appropriate to consider it a developmental disadvantage.

Be as it may, it is also clear that even within a single culture not all children will be granted equal access to rich learning environments. This is particularly true in a profoundly unequal society such as ours, where social categories such as race, gender, class, etc., provide schemas of interpretation for what children can and cannot learn, as well as social rules that prescribe how they should participate in various activities in their developmental niches. In other words, the environment in which children develop is structured according to sociocultural biases that concern their developmental trajectories and cognitive abilities, which provide different sets of opportunities and constraints for children from different social groups.

Some of these biases will be culturally transmitted in the form of explicit instructions, such as when parents tell their daughter that she should play with dolls and restrain herself at the playground because girls are more "delicate" and "caring", at the same time that they tell their son that he should play with toy guns and race cars because boys are more "aggressive" and "energetic" (Young, 1980). At other times, however, these biases may be subtly manifested in the different ways in which caretakers respond to and interact with children from different social groups. If this is true, we need another notion of cultural bias, besides reflective beliefs, in order to capture the interplay between sociocultural stereotypes and behavioral dispositions

and their influences on the developmental niche of children from different social groups.

One prominent candidate that comes to mind is implicit bias, a psychological construct posited in empirical psychology to explain a range of phenomena where subjects' behaviors towards a certain object x cannot be explained by subjects' reflective beliefs about x, but needs to appeal to attitudes towards x that operate under the radar of subjects' awareness. With this construct in hand, we can ask: are there implicit biases in developmental niche construction that negatively impact children from different social groups, even if caretakers are often unaware of these biases and their negative effects?

We believe that there are, and we will present arguments and evidence in favor of this claim. More specifically, we will focus on the developmental niche of atypical children with Down syndrome and autism, and show how implicit biases on the part of caretakers lead to impoverished developmental niches that may be detrimental to their cognitive development. To do so, however, we first need to clarify what we mean by "implicit bias", since there is a lot of confusion in the literature about what this psychological construct refers to. We will then show how these biases are enacted in developmental contexts and provide evidence for their detrimental effects on developmental niches.

The structure of the paper is as follows: section 1 will be dedicated to clarifying our favored notion of implicit bias. Based on theoretical tools from the phenomenological tradition, we will, following Céline Leboeuf (2020), conceptualize implicit bias as *embodied perceptual habits*, or socially learned ways of engaging with the world. Section 2 will briefly explain niche construction theory with a special focus on the developmental niche. Once we have a clear notion of implicit bias and a working concept of the developmental niche, Section 3 will then present two case studies based on children with Down syndrome and autism as evidence for the deleterious effects of implicit bias on these children's learning environments. We will then offer

some concluding remarks on possible interventions to mitigate these effects, as well as highlight some theoretical and practical advantages that adopting our framework might bring.

1. Implicit bias

1.1. *What is implicit bias?*

Implicit bias is a psychological construct posited in order to explain a range of phenomena where subjects' behaviors towards a certain object *x* cannot be explained by subjects' reflective beliefs about *x*, but needs to appeal to attitudes towards *x* that supposedly operate under the radar of subjects' awareness. This construct arose with the development of indirect measures of attitudes in the 1970's and 1980's, in which subjects are not asked directly about their attitudes towards *x*, but are instructed to engage in behaviors that are supposed to detect automatic expressions of these attitudes. Whatever it is that these indirect measures detect is what *implicit bias* refers to. Since there is often a dissonance between subjects' reflective beliefs and their so-called "unconscious" evaluations, the latter came to be called *implicit attitudes* or *implicit bias*.[1]

The most popular indirect measure of attitudes is undoubtedly the Implicit Association Task, or IAT (Greenwald et al., 1998). In a famous study designed to detect racial biases, most subjects were slower to associate photographs of black persons with words denoting positive qualities, and faster to associate these same photographs with words denoting negative qualities, while this pattern was reversed with photographs of white persons, even when subjects endorsed egalitarian and antiracist beliefs.

These indirect measures have been recently criticized by Edouard Machery (2022) as

[1] It is a matter of contention whether implicit *attitudes* and implicit *biases* amount to the same thing, and whether unconsciousness is a constitutive mark of implicit biases. For discussion see Brownstein et al., 2019.

being highly unreliable and variable across test/retest, as having very low predictive validity concerning behavior, and as providing no evidence that what is being measured is an implicit attitude that causally impacts behavior rather than something merely epiphenomenal. These criticisms dealt a hard blow to implicit bias research and posed serious difficulties to this psychological construct on both conceptual and methodological grounds. Now, after everything that's been said, could there still be a theoretically useful notion of implicit bias that can be applied to niche construction processes, as we claim in this paper?

We argue for an affirmative answer. However, in order to do so we will put forward a notion of implicit bias that differs significantly from the way it is typically defined in empirical psychology, and that does not depend on the reliability and predictive validity of indirect measures such as the IAT. We will, following Céline Leboeuf (2020), conceptualize implicit bias as *embodied perceptual habits*, or socially learned ways of engaging with the world that are enacted in particular contexts and embedded in larger social structures. We will thus abandon more mentalistic associationist models presupposed in most of the empirical literature, according to which implicit biases are unconscious belief-like states that result from automatic associative processes.[2]

1.2. *Implicit bias as embodied perceptual habits*

Céline Leboeuf argues that "implicit biases should not be conceived of as inside the head of individuals, but rather as *embodied* and *social*" (2020, p. 41). We agree. Leboeuf's notion of habit is borrowed from William James (1890/1950), who took them to be behavioral routines that improve performance by facilitating the movements required to complete it, and in which

[2] For an example see the Associative-Propositional Evaluation Model by Gawroski & Bodenhausen (2011).

there is little or no conscious attention involved. When we first learn how to drive a car the different subtasks involved in the process (shifting gears, looking at the rearview mirror, etc.) are cognitively demanding and require conscious attention. As our practice improves over time these movements become habitual, and we learn how to automatically position our bodies and smoothly execute a series of motor actions that will lead to successful behavior. It is the diminished conscious attention that comes with practice and the smoothness with which familiar actions are executed that makes these habits seem “unconscious”, or "automatic".

The idea of *perceptual* habits is borrowed from Merleau-Ponty, who famously argued that perception is not a passive registration of sensory features of the external world. Rather, for Merleau-Ponty we learn how to see, in much the same way as we learn how to drive a car, i.e., by learning how to move and position our bodies in order to manipulate objects and interact with persons in appropriate ways. In other words, to perceive objects like doors and chairs is to perceive objects that are already imbued with meaning and which are experienced as accessible to us, in relation to which we can perform various actions such as *sitting*, *opening*, etc. We learn, therefore, how to perceive objects in this manner by acquiring habits of seeing, which include things like posture, orientation, direction of gaze, patterns of attention, etc, which help us deal with various aspects of the world. As Merleau-Ponty puts it, when we acquire a perceptual habit we acquire “a certain style of seeing, a new use of one’s body” (1945/2002, p. 177). And of course, other people are some of the most important aspects of the world, and we acquire habits of seeing persons from different social groups that help us navigate the social world, which include not only registering how these people *look* but also how we should respond and interact with them in different contexts. How one perceives one’s caretakers, in this sense, is very different from how one perceives one’s teacher, a police officer, a store clerk, or a stranger down the street.

We don't, however, face the challenge of how to engage with various aspects of the world on our own, by simple trial and error. Rather, our learning process is deeply intersubjective and scaffolded by the material and social context in which it takes place, and most of our embodied habits are acquired by observing, imitating and interacting with others. How others around us behave and engage with various aspects of the world, in turn, is embedded in larger social structures and influenced by social categories such as gender, class, race, ethnicity, and so on, and reinforced by various institutions that help maintain and transmit such structures (such as school, religious traditions, family, etc). This means that we develop habits that are not only similar to those of our caretakers but also to those of our social group.

As an example, take Sarah Ahmed's phenomenological analysis of whiteness (2007). Ahmed argues that whiteness can be understood in terms of a pre-reflective orientation in space in which a range of things, such as material objects, aspirations, skills, etc, are experienced as within reach and as open to manipulation. This pre-reflexive orientation is inherited from, and transmitted to, other white persons and reinforced by various institutions that help keep them in place. As such, white persons typically occupy and move through space in a more expansive manner relative to other racial groups, as if space itself, along with its material and social structure, were always rightfully available for grabbing. This pre-reflexive orientation of whiteness can be here understood as a *racial bias*, in the sense of being a habitual, embodied way of engaging with objects, persons and places that is structured by one's racial group. To quote Leboeuf, "to harbor an implicit bias simply means to use the body in a biased way" (2020, p. 48). This embodied habit will affect not only how one engages with persons from other racial groups, but also how one occupies and moves through space and engages with social, material and epistemic goods that are accessed and transmitted from within one's racial group. Thus, when we speak, following Leboeuf, of embodied perceptual habits, the gloss on "perceptual"

should not mislead us into thinking that we are talking of the registration of sensory features. Rather, as should be clear from the discussion above, perceptual habits include motor response patterns, affective dispositions, body postures and orientations, and so on.[3]

In order to account for the social element of embodied perceptual habits, Leboeuf deploys Bourdieu's concept of the *habitus* (1980/1990), which seeks to capture the role of larger social structures in organizing our perceptions, tastes, preferences and habitual bodily movements in a coordinated and systematic manner, according to social categories such as race, class, gender, etc. This move is important because it places implicit biases not within individuals but as properties of the social environment, as habitual ways of negotiating the world that are inherited, enacted and transmitted by whole social groups.

In fact, for Bourdieu habits are at the same time a property of individuals and a property of the social world. We can talk, for example, about "the habit of driving on the left" either as a habit of the British population in general, or as the habit of Mary, an English woman. What this means is that although the habit is enacted by Mary in particular driving contexts, the habit is available in, and structured by, Mary's social context. Mary acquired this habit by observing, learning from, and imitating other people around her, and we can only explain why Mary deploys her body in a certain manner while driving by mentioning larger social structures, rules and institutions that are operative in Mary's country. In a similar vein, a racial habit, in Ahmed's sense, is a feature of the social world that structures our individual ways of interacting, responding to and engaging with various aspects of the world in terms of racial categories and their social significance.

[3] Michelle Maiese (2016) develops some similar ideas with her analysis of how "affective frames" and "habits of mind", as she terms them, shape our habitual ways of attending to, making sense of, and actively engaging with our surroundings over multiple timescales. See also Colombetti and Krueger (2015) on "bodily-affective styles".

But since habits are at the same time properties of individuals and properties of the social world, there are continuous feedback loops between both levels, so that not only social habits structure individual habits, but individual habits also contribute to sedimenting social habits. When black activists raise awareness of certain racist uses of language, this puts pressure on individuals to cease using certain terms in their speech, which in time amounts to a change in the social racial habit, as dispositions to deploy certain language and ways of speaking are modified by individual behavior.

Therefore, from now on, whenever we talk of *implicit bias* this should be understood, following Leboeuf, as *embodied perceptual habits*. This formulation seeks to capture the fact that our habitual ways of engaging the world are conditioned by our social environment, and that we typically deploy these habitual patterns of (motor/affective/embodied) responses with little conscious awareness.

Now that we have a clearer notion of implicit bias, in the next section of the paper we will clarify what we mean by processes of niche construction, with special emphasis on the developmental niche. Our main claim is that embodied perceptual habits may contribute to the construction of maladaptive developmental niches for children with Down syndrome and autism. With this analysis we hope to provide theoretical tools that might help us identify cases of maladaptation as well as think of interventions that might lead to more adaptive developmental niches.

2. Niche Construction

2.1. *What is niche construction?*

Niche Construction Theory (NCT) was developed in order to capture the way organisms modify

their environments through their activities and how these modifications change the selection pressures that act upon them (Laland et al., 2000, Odling-Smee et al., 2003). Niche construction processes have been considered by some researchers as one of the most powerful forces in evolution, whereby environmental modifications are understood as evolutionary processes that cause evolutionary change by acting as sources of modified selection (Flynn et al., 2013). These considerations put NCT in contrast with "gene-centered" views of evolution whereby organisms are little more than vehicles for their genes (Dawkins, 1976), conceiving them instead as actors that co-determine their own evolutionary path. Processes of niche construction in NCT concern not only the various environmental structures built by organisms such as burrows, nests, webs, dams, etc, but also tools and artifacts, institutions, social and political systems, as well as public symbols like language or arithmetical notation, all of which can be conceptualized as environmental modifications with evolutionary significance.

Following the work of Fabry (2021) and Coninx (forthcoming), NCT can focus on different aspects of environmental modifications along different timescales and spatial scopes, depending on the theoretical interests at stake. We can thus talk of the *phylogenetic niche*, which concerns collective modifications through the activities of a whole species or population; the *sociogenetic niche*, which concerns modifications through the activities of a subpopulation; the *ontogenetic niche*, which concerns an individual modification of one's environment along one's lifespan; and the *microgenetic niche*, which concerns local environmental modifications to solve particular problems in the here-and-now.

In addition, niches can also be distinguished functionally according to the specific activities they scaffold, such as organizing, storing and providing access to information (epistemic niches), expanding cognitive abilities (cognitive niches), facilitating emotion regulation (affective niches) or providing learning opportunities in a developmental context

(developmental niche). Of course, these distinctions are drawn from a theoretical point of view, as niches will often have more than one function simultaneously. A university is at the same time a repository of information (epistemic niche), which contains socio-material structures that augment our cognitive abilities (cognitive niche), and where we meet friends and colleagues that help us attain certain affective states (affective niche). But we can, if we wish, decide to focus on one of these aspects in order to provide a more detailed characterization of how the various structures of the niche help accomplish such functions.[4]

In this paper we will focus on a particular type of niche – the *developmental niche* – and highlight the way embodied perceptual habits on the part of caretakers can make the niche maladaptive to children with Down syndrome and autism. Before we explain what we mean by the developmental niche, however, let's first analyze the various ways in which niches can be maladaptive.

2.2. *The negative side of niche construction*

Niche construction is usually described in positive terms, by highlighting features of the niche that have adaptive value for the species/groups/individuals involved. However, there's been a growing interest in identifying cases in which environmental modifications turn out to be harmful, such as corporate environments (Slaby, 2016), health care practices (Coninx, forthcoming) or casinos (Timms & Spurrett, 2022). For this purpose, NCT offers valuable theoretical tools that allow us to capture how certain kinds of injustices arise out of the way the environment is structured and used by certain persons or social groups. Our paper can thus be understood as another contribution in that direction.

[4] For some examples see Colombetti & Krueger, 2015; Tanesini, 2022; and Sterelny, 2010, on affective, epistemic and cognitive scaffoldings respectively.

We will here follow Coninx (forthcoming) and understand *adaptation* (broadly construed) as a "change in the relation between organism and environment" (p. 8), in which positive and negative changes are taken to be adapative and maladaptive respectively. In this sense, "adaptive processes serve the interests, concerns and needs of a stakeholder, while maladaptive processes counteract them" (*ibid.*).

In evolutionary biology adaptation is commonly understood in terms of *fitness*, so when we ask whether certain environmental modifications are adaptive or maladaptive we are, in that framework, asking whether they contribute to, or hinder, survival and reproduction. However, when we take other perspectives on niche construction, as highlighted in section 2.1 – that is, sociogenetic, ontogenetic or microgenetic perspectives – our theoretical interests are not primarily focused on (or, at least, need not be exhausted by) questions of reproductive fitness or genetic inheritance. According to Coninx, when we highlight ontogenetic features of niche construction (which is our main focus on this paper), what matters most for (mal)adaptation are matters of *well-being*. As she puts it:

Ontogenetic Criterion of (Mal)Adaptation: Alterations of environmental features are considered adaptive when the corresponding modifications of idiosyncratic phenotypical properties (e.g., cognitive, affective, or interpersonal practices) enhance and maladaptive when they reduce a person's well-being. Well-being is understood in terms of a person's physical, psychological, and social integrity, including their ability to lead a personally fulfilling and meaningful life (forthcoming, p. 8-9).

We believe Coninx's definition captures a range of interesting cases in which environmental modifications end up being maladaptive in virtue of hindering well-being, but

we also believe there are other dimensions besides well-being that may be used in criteria of maladaptation. In particular, as we said before (section 2.1), niches can be functionally distinguished according to the specific activities they scaffold (epistemic, cognitive, affective, etc). That is to say, even if we keep the ontogenetic perspective fixed, our criteria of maladaptation may vary along these dimensions, as can be shown in the following formulation:

Functional Criterion of Maladaptation: Alterations of environmental features are considered adaptive when the corresponding modifications of idiosyncratic phenotypical properties (e.g., cognitive, affective, or interpersonal practices) contributes to and maladaptive when they hinder the niche's main function that is the focus of analysis.

For example, if we focus on a university as an affective niche, the high rate of mental health issues such as depression, anxiety and suicidal ideation among college students (Lipson et al., 2022) suggests that this affective niche can be maladaptive, relative to the function of scaffolding emotion regulation. This is so even if the same environment turns out to be adaptive along some other dimension, such as scaffolding epistemic activities or augmenting cognitive capacities.

In this paper we will focus on maladaptive features in the developmental niche of children with Down syndrome and autism, which concerns the way the environment is structured, typically by adult caretakers, to scaffold these children's learning and cognitive development. Our claim will be that, although caretakers may have the children's best interests in view, embodied perceptual habits (implicit biases) leads them to structure these learning environments in a way that is maladaptive in the sense above, i.e., as detrimental to the niche's

main function of fostering cognitive development. But before we present evidence for this claim we will first explain what we mean by the developmental niche.

2.3. *The developmental niche*

The concept of the developmental niche was introduced by Super and Harkness (1986) in order to capture the cultural and psychological regulation of the environments of children in developmental contexts. In this framework, child development is conceived as a situated and environmentally scaffolded activity embedded in larger sociocultural systems, in which the learning environment itself is conceived as a cultural construct. This means that the objects, persons, rules, expectations and interaction patterns that constitute the developmental niche are structured by sociocultural demands and practices, which jointly enable children to grow into competent members of their communities. The developmental niche is, therefore, at the same time a mechanism of cultural transmission and a scaffold for cognitive and social development. This concept of the developmental niche covers not only environmental structures designed to hold formal pedagogical activities (i.e., schools), but also more informal learning contexts such as family reading sessions, household chores, or assisted structured play (board games, etc.). Since in this framework cultural biases and beliefs about child-rearing directly influence how developmental niches are constructed, it is a very suitable framework to capture biases in niche construction, which is the main goal of this paper.

In order to capture various sociocultural influences on niche construction, Super and Harkness put forward three subsystems of the developmental niche, which act in a coordinated manner to mediate the child's developmental experience within the larger values and goals of the culture. These are:

1. Sociomaterial settings
2. Customs of child-rearing
3. Psychology of caretakers

The first subsystem refers to physical and social settings in which the child spends most of her daily life; which persons will be typically encountered, the kinds of interactions they are expected to have, the environments they are supposed to occupy, the objects they are expected to encounter, which of these objects they should or should not engage with, and so on. Focus on this subsystem highlights how child development is a situated process that always takes place in a cultural setting and that at the same time leads to modifications in that very setting. These modifications might lead to distinctive developmental trajectories, allowing us to capture how differences in child development do not always reflect differences in cognitive structures but can often be traced to differences in culturally structured sociomaterial settings.

To clarify this point, let us consider Super and Harkness' (1982) cross-cultural comparisons between child development and child-rearing practices among the Kipsigis in rural Kenya and American middle-class families in metropolitan Boston. The Kipsigis expect their children to play a significant part in household chores as soon as they are old enough to do so, and by age four they will spend as much time in work-related activities as in play and rest (1986, p. 554). In fact, Super and Harkness observed that the Kipsigis understand stages of child development through the goals of social responsibility, that is, in terms of ages in which children are expected to be able to do various chores by themselves. Middle-class Americans, in contrast, structure early child development around play, and this sets different parameters for environmental modifications and social interactions. In these households babies will typically have their own room equipped with toys that are specifically designed to scaffold cognitive

development, whereas Kipsigi children will sleep with their parents and have few objects of their own. Social and playful interactions among the Kipsigis typically take place in the context of household tasks, and are often punctuated and interrupted by work demands (*ibid.*). In contrast to middle-class American families, which typically have play-oriented environments, what is considered "play" for the Kipsigis is seamlessly integrated into "work", and the environment in which development occurs reflects this cultural value.

As we mentioned before, all subsystems of the developmental niche are dynamically intertwined, and this becomes clear when we consider how socio-material settings and customs of child-rearing interact. In settings where there is a constant threat of venomous animals or the common presence of potentially dangerous objects such as cooking fires or deep water wells, degrees and styles of adult supervision will be adjusted accordingly (1986, p. 555). In this sense, customs of child care can be understood as community-wide solutions to recurrent challenges posed by the ecological and socio-material setting, which are mutually adjusted and co-evolves with the setting. These include everyday activities such as how to carry and feed babies or put them to sleep, as well as more institutionalized rituals such as formal schooling at specific ages.

According to Super and Harkness, customs of child care can be defined as "sequences of behavior so commonly used by members of the community, and so thoroughly integrated into the larger culture that they do not need individual rationalization and are not necessarily given conscious thought" (1986, p. 555). This characterization makes them quite similar to the embodied perceptual habits introduced in section 2. Embodied perceptual habits, therefore, play an important role in how the developmental niche is constructed, being at the same time a response to recurrent challenges posed by the environment as well as culturally structured modes of behavior that change that very environment.

But a full characterization of how embodied perceptual habits impact developmental niche construction would not be complete without the third subsystem of the developmental niche, the psychology of the caretakers. This is an umbrella term that covers at the same time culturally transmitted beliefs about child development and behavior, as well as socially learned affective orientations towards infants and cultural schemas of interpretation for children's behaviors. They help organize parental strategies of child rearing and impact how the developmental niche is constructed.

It is important to consider both reflective beliefs and pre-reflective orientations in developmental niche construction because whereas some beliefs are transmitted from generation to generation in the form of explicit instructions, not all child-rearing customs will be culturally transmitted in this form. As an example of the former, the Kipsigis believe (and teach the next generation) that infants will not learn how to sit unless explicitly taught how to do so, and this belief helps organize parental strategies of child-rearing that structure the developmental niche in terms of certain practices and patterns of interaction. As a result, Kipsigi babies begin to sit by themselves at an earlier age (1986, p. 556). However, customs of childcare can also be learned and transmitted through repetition, observation, imitation, reinforcement, and correction, as well as through cultural symbols and media. In this manner, novice caretakers learn embodied ways of interacting, responding, and interpreting their children's behaviors, as well as social norms of what constitutes appropriate child-rearing practices according to sociocultural values and demands. These embodied orientations and dispositions are not always captured by reflective beliefs.

When a Kipsigi child is emotionally distressed, for example, there is typically little room for negotiation between child and caretaker. What Super and Harkness observed is that among

the Kipsigis it is the sole job of caretakers to regulate their child's emotions, so they will not typically inquire into the child's feelings or preferences but will simply do what needs to be done to get the child to comply according to sociocultural norms (1986, p. 564). This observation can be interpreted through Kipsigis' cultural goals of collectivity, obedience and social responsibility, according to which the needs and preferences of the individual have lower priority relative to communitarian harmony. These goals, however, need not be explicitly articulated by caretakers in the form of reflective beliefs, but can be enacted in the form of pre-reflective orientations and affective dispositions (see Krueger, 2013).

This suggests that embodied perceptual habits can be located between the second and third subsystems of the developmental niche, or customs of child-rearing and psychology of caretakers. When we consider embodied perceptual habits as properties of the social world they fall on the side of customs of child-rearing, but when we consider how these habits are enacted by individuals in particular contexts of child-caretaker interactions they are better captured by the psychology of caretakers. Since these two subsystems are dynamically intertwined and act in a coordinated manner, there is no incoherence in describing embodied perceptual habits as both a child-rearing custom and a psychological force that shows up in caretakers' pre-reflective orientations, firmly scaffolded by the external environment and structuring environmental modifications at the same time.

Thus, when we claim that biases in niche construction may impact the construction of the developmental niche, this can be understood, in Super and Harkness' framework, as how culturally transmitted child-rearing customs and pre-reflective orientations towards children are responsible for structuring the developmental niche in certain ways. Since embodied perceptual habits are properties of the social world that are enacted by individuals in particular contexts,

this notion of implicit bias is particularly fit to capture biases in niche construction.

In the next section we will deploy this concept of the developmental niche to the learning environments of children with Down syndrome and autism. Following criteria of maladaptation laid out in section 3.2 we will suggest, based on empirical evidence, that at least in some cases their developmental niche is maladaptive in the sense of not being conducive to their adequate cognitive development, and that this maladaptation can be traced to embodied perceptual habits towards atypical children that operate in between atypical child-rearing customs and pre-reflective embodied orientations of caretakers.

4. Case studies

4.1. *Down syndrome and home literacy environments*

Down syndrome is a genomic disorder originally described by John Langdon Down in 1862. It is caused by a trisomy of chromosome 21 which occurs in approximately 1 in 800 births worldwide. Its phenotype manifests in the musculoskeletal, neurological, and cardiovascular systems, and individuals with Down syndrome typically have developmental delays as well as linguistic and cognitive impairments (Antonarakis et al., 2020). Nevertheless, there is widespread evidence that when their development is adequately supported individuals with Down syndrome can live happy and meaningful lives (Skotko et al., 2016). In addition, providing them with education in inclusive rather than separate classrooms brings benefits in linguistic and literary skills (van Herwegen et al., 2018), and rich home literacy environments can lead to significant improvements in linguistic development (Ricci, 2011), especially if parents adopt a more interactive reading style (Frizelle et al., 2022).

In light of this last evidence, we can ask if the developmental niches of children with

Down syndrome are constructed in ways that foster or hinder their linguistic development. That is to say, if these niches are adaptive or maladaptive regarding that very function. In this regard, we will consider as part of the development niche the items and practices that scaffold linguistic development such as the presence and availability of books and other printed material, frequency and duration of reading sessions, as well as styles of interaction and responses that caretakers tend do adopt in relation to children with Down syndrome. In other words, all three subsystems of the developmental niche as identified by Super and Harkness.

Evidence suggests that many children with Down syndrome develop in rich home literacy environments (Ricci et al., 2011). Thus, we do not claim that the developmental niches of children with Down syndrome are *generally* maladaptive. Rather, our aim is more modest than that. We simply seek to identify certain instances of maladaptation and show that these instances can be explained by embodied perceptual habits that affect niche construction processes. This should provide the theoretical tools needed to better identify these cases and the sociocultural and psychological factors that may be responsible for this maladaptation.

In this sense, one particular study will be of special interest to us. Fitzgerald et al. (1995) recorded shared reading sessions in the homes of three children with Down syndrome to gain insight into their literacy environments. In one of the homes the child with Down syndrome (George) had a typical sibling (Janet) with the same developmental age.[5] The researchers found that the mother manifested different interaction styles with both children. While her interactions with George were mostly limited to actual text renderings and simple positive feedback ("right", "good", etc.), with Janet she adopted a more interactive style, with more varied kinds of feedback as well as three times more uses of metalinguistic verbs (i.e., *tell* me, *read* that, etc.).

[5] George was 46 months old at the time of the study, while his typical sister Janet was 22 months old. George's developmental age was estimated by the researchers as approximately the same as Janet's.

In addition, she made mostly low-level cognitive demands on George, only a few mid-level demands, and no high-level ones, whereas with Janet she made twice as many mid-level demands and plenty of high cognitive ones.[6] Although one could argue that it might not be appropriate to make high-level cognitive demands on a child with more limited cognitive abilities such as George[7], it should be noted that high-level demands, as defined by Pellegrini et al., are not really that demanding ("let's try another way", "why did it happen like this"), and are labelled "high-level" only relative to low and mid-level ones, which are even simpler. In addition, according to the study Janet and George share the same developmental age, so if Janet can handle so-called "high-level" demands, so can George.

We thus conclude, based on the evidence, that caretakers will sometimes change their interaction style when engaging with an atypical child, and thus provide them with a more impoverished developmental niche. Since there is evidence that more interactive reading styles brings benefits to the linguistic development of children with Down syndrome (Frizelle et al., 2022), we can at least suppose that George develops in a more impoverished niche relative to his sister Janet. How is this to be explained?

Well, since the evidence is limited to the experience of one family during a relatively short period of observation (14 consecutive days) we cannot rule out alternative explanations, but we would like to follow up on the authors' favored hypothesis that George's mother "had lower expectations for literacy learning for her son with Down syndrome than for her nondisabled daughter whose chronological age was about the same as the developmental age

[6] The scale of low, middle and high level cognitive demands comes from the work of Pellegrini et al. (1990) on joint reading activities with children. In their framework low-level demands include observations ("watch me"), demonstrations ("I am reading this now") and labeling ("this is a tree"); middle-level demands include inference of similarity ("how are they similar?"), sequencing ("first do this, and then that"), clarifications ("which go together?"), etc.; and high-level demands include cause-effect inferences ("why did it happen like this?"), alternatives ("let's try another way"), conclusions ("why would it end like this?"), planning ("first tell me all you know about the story"), and so on. See Pellegrini et al. 1990 for discussion.

[7] This point was raised by an anonymous referee.

of the child with Down syndrome" (Fitzgerald et al., 1995, p. 329). This hypothesis is compatible with evidence that families with children with Down syndrome spend about half as much time on reading sessions relative to families with typical children (Ricci, 2011), and that parents of children with Down syndrome tend to immediately veto any overgeneralizations when they are learning new vocabulary, whereas parents of typical children typically allow them to freely overgenerate (Karmiloff-Smith, 2009). Karmiloff-Smith hypothesizes that parents of children with Down syndrome fear that their children will never learn how to use a name correctly if allowed to overgeneralize, due to general lower intelligence and impaired linguistic skills. This leads to an impoverished developmental niche with less variation in linguistic input and less rich and varied interactions in shared reading sessions.

These observations support Karmiloff-Smith's claim that parents of atypical children will subtly change their interaction and response behavior when they receive a diagnosis, due to a series of "unconscious assumptions about atypical development" (2009, p. 60). This sounds a lot like implicit biases, but as we've been saying throughout this paper, we shouldn't think of it as some form of "implicit" mental state such as an unconscious belief. Rather, what we should say is that caretakers enact embodied perceptual habits in relation to atypical children. When caretakers receive a diagnosis they tend to adopt a different child-rearing custom and begin to use their bodies in a distinctive way when interacting with their child in their developmental niche, which does not always work in favor of their cognitive and linguistic development. In other words, by enacting embodied perceptual habits caretakers are constructing a maladaptive developmental niche relative to its function of scaffolding linguistic development.

4.2.Autism

Our second case study is autistic spectrum disorder (ASD). As with our discussion of

Down syndrome and home literacy environments, ASD provides evidence that some of the developmental disorders and social impairments commonly associated with ASD should not be understood as emerging exclusively (or even primarily) from specific brain modules, but rather in terms of children's and adults' ontogenetic histories in developmental niches. Here, implicit bias (as embodied perceptual habits) and the social, normative, and material structure of the developmental niche create maladaptive conditions potentially hindering their development. Like Down syndrome and home literacy environments, this developmental experience plays out across three interrelated subsystems of the developmental niche: *socio-material settings*, *customs of child-rearing*, and the *psychology of caretakers*.

According to current diagnostic guidelines, ASD is a disturbance of one's ability to engage with others and the social world. It spans a range of social and communication difficulties. Although these difficulties vary by individual, they generally lead to challenges communicating with others, becoming attuned to their emotions, and adapting to changing and unpredictable social environments. Within current debates, a *neuro-cognitive* perspective remains dominant (Chapman, 2019). This perspective sees autistic differences as stemming from neurocognitive differences found in all autistic individuals. They rest on an empathy deficit, or so-called "mind-blindness" (Baron-Cohen, 1995), that makes it difficult to interpret and predict others' behavior and smoothly integrate with the shared practices of everyday life.

Recently, this neurocognitive approach has been challenged from several fronts in ways amenable to the niche construction framework. These alternative frameworks argue for a more holistic and multidimensional approach stressing *embodied*, *interactive*, *relational*, and *developmental* processes overlooked by neurocognitive approaches (see, e.g., Bizzari, 2018; De Jaegher, 2013; Donnellan et al., 2012; Krueger & Maiese, 2018; Schilbach, 2016; van

Grunsven, 2020). For example, there is now increased sensitivity to how autistic people[8] use their bodies in distinctive ways to move through the world, process their experiences, express emotions, and respond to the people, things, and spaces around them (Doan & Fenton, 2013). Instead of focusing exclusively on cognitive traits, these perspectives argue that understanding distinctive features of autistic embodiment is crucial for understanding how they find their way through the world and encounter forms of resistance and lack of support that may contribute to their social and communicative difficulties. This is because autistic people often struggle to negotiate neurotypical (i.e., non-autistic) forms of life (Chapman, 2019a): norm-governed contexts, spatial environments, customs, rituals, habits, practices, expectations, language, patterns of emotional sharing, etc. All of these things are aspects of everyday life that neurotypicals take for granted. However, without access to these resources, autistic people can find it difficult to navigate spaces not set up to accommodate their ways of moving, experiencing, and expressing (Krueger, 2021a, 2021b).

How might the perspective we advocate here supplement these emerging approaches by highlighting features of maladaptive developmental niches? Consider first how neurocognitive approaches — which classify autism as a neurodevelopmental disorder — generate a *medical deficit model*. This medical deficit model portrays autism as a harmful developmental trajectory stemming from underlying neurological dysfunction (Chapman & Carel, 2021; see also Kidd & Carel, 2018). One consequence of this assumption is that autism is taken to be incompatible with human flourishing and the good life. And *this* assumption, in turn, can lead to the cultivation of embodied perceptual habits which, even in supportive caregivers and well-intentioned others, nevertheless reflect an implicit bias about what autistic people can and

[8] We here follow terminological preferences of neurodiversity proponents who endorse identity-first language ("autistic persons") to emphasize the connection between cognitive and emotional styles and selfhood (Pellicano & Stears, 2011).

cannot do, and what sort of accommodations therefore should or should not be made for them.

To see how so, note first that many metaphors widely used to represent autism to the public perpetuate and reinforce this assumption (Chapman & Carel, 2021). Media and press discussions often frame autism through metaphors of *combat*, *kidnapping*, *barriers*, or even *death*: "We are fighting against autism"; "Autism stole my child"; "He is behind the wall of autism"; parents grieve for "lives cut short by autism" (Gross, 2012). These representations of autism often exhibit "a totalizing narrative of tragedy" and loss (Stevenson, 2007, p. 198). Even some philosophers argue that in light of their purported inability to make empathic connections, as well as their need for consistent medical intervention, autistic people will struggle to flourish (Barnbaum, 2009; Furman & Tuminello, 2015). This widespread medical framing — and the metaphors, language, and assumptions that flow from it — reinforce the assumption that autistic people are either not interested in, or capable of becoming, responsive participants in the social world.

This is a complicated matter that ranges across important issues of neurodiversity and inclusion. We cannot do justice to it here (see Chapman, 2019a). For our purposes, the point is that these metaphors and narratives have practical impact: they shape the autistic persons' *developmental niche*, insofar as they shape how children and adults are treated by non-autistic people and what sort of accommodations are (or crucially, *are not*) made as they interact with them. One way this occurs is by generating embodied perceptual habits that shape how neurotypicals (including parents, caregivers, and teachers) interact with autistic people — often in ways that are maladaptive for their social development and facility.

To make this concrete, consider the dynamics of face-to-face interaction. For many children and adults with autism, it is acceptable to avoid making eye contact when speaking with someone, take a long pause before responding (Leary & Donnellan, 2012), or provide

direct answers to potentially sensitive questions ("Do I look good in this shirt?"; "No, you do not!") (Chapman, 2019, p. 430). But these practices are discouraged in neurotypical niches.

A striking example of how embodied habits of neurotypicals might shape maladaptive niches concerns delayed responses in conversation. Donnellan and colleagues found that twelve young adolescents with minimal verbal skills, all of whom were labeled developmentally disabled or autistic, could offer competent conversational responses — but only, on average, after fourteen seconds of silence (Leary & Donnellan, 2012, p. 57). Since most neurotypicals embody perceptual habits that lead them to expect much faster responses, they will likely change the subject or leave the conversation altogether in order to avoid these long silences. Over time, the cumulative effect of being bodily "stopped" (Krueger, 2021b) within these disrupted interactions can reinforce an autistic person's feeling of social exclusion, and intensify their feeling that they lack the skills and standing to engage with others and the wider social world. This is apparent in quotes like the following: "I got to a stage where I was so used to being mistaken by others, misinterpreted, misunderstood; I thought, well, sod it. If you're going to misunderstand me, I'm not going to even, going to…I just closed off later on in life. I just thought, sod it" (quoted in Hickey et al., 2018, p. 363). It's long been widely assumed that autistic people are disinterested in the world and generally don't experience loneliness. However, their first-person reports like these often tell a different story (Krueger et al., 2023). The strain of social exclusion and trying to negotiate maladaptive niches, organized around neurotypical perceptual habits, can lead to a deep feeling of disconnection and aloneness.

The feeling of being bodily stopped by maladaptive niches also arises in other ways. Consider self-directed bodily practices of "self-stimulation" (or "self-stims", or "stimming") — hand-flapping, finger snapping, tapping objects, repetitive vocalizations, or rocking back and forth — that help autistic people manage incoming sensory information and feel rooted in their

bodies and the world. These things often confuse neurotypical people or make them uncomfortable; they violate perceptual habits and expectations about how we should inhabit and use our bodies. Treatment programs, usually developed with little input from autistic people, traditionally try to suppress or eliminate them.

Autism is a particularly useful case study because it highlights how the feeling of being stopped is not limited to face-to-face interactions. It also arises when dealing with the built environment. A noisy, colorful, and brightly lit classroom, lecture hall, playground, temple, pub, gym, restaurant, or retail space, for example, may negatively impact an autistic person's auditory and visual hypersensitivity in ways neurotypical bodies don't understand or appreciate. For autistic people, the design of these spaces does not afford feeling at home. Instead, they are disorienting and bodily upsetting. And while not all of these spaces are *explicitly* designed to be developmental niches — apart from classrooms, lecture halls, playgrounds, and perhaps temples, which are clearly set up to foster cognitive and social development — they all nevertheless have developmental significance. This is because children learn how to think, speak, act, understand themselves, and connect with others in different ways as they negotiate these different spaces. As we saw previously with our discussion of Kipsigi children, who learn important things about their identity, social responsibility, and community expectations by participating in household chores, developmental niches are not confined to the classroom. Many other everyday spaces are also important learning environments for children. They learn about sociocultural practices and expectations, which enable them to grow into competent members of their communities, by watching and mimicking what they see in these spaces: e.g., how to worship in a culturally accepted manner by going to a temple, say, or how to dine with adults by going out to dinner. In this way, they gradually learn how to negotiate these spaces and use the things in them for themselves.

Again, in the case of autism, many of these spaces are not set up to accommodate and support the needs of autistic bodies. As a result, many possibilities for learning, social connection, and shared experience — beyond whatever practical actions these spaces afford — are experienced as bodily out of reach. These spaces are set up in ways that reflect a bias toward neurotypical forms of embodiment and sensory processing and can, accordingly, have a detrimental effect on the experience and development of autistic bodies that inhabit them (Boldsen, 2022a, 2022b). Within a public setting, the acoustics, unpredictability, and sheer number of different sound sources at a given time can intensify this effect.

Consider this description of early experiences of school environments:

"I was often lazy in school because sometimes my ears distorted the teacher's instructions or my eyes blurred to stop me seeing the blackboard properly. Or sometimes I would hear a word or two at the start and understand it and the next lot of words sort of merged into one another. And I could not make head or tail of it. I can now recall that one could sometimes refer to my vision and hearing as being like an untuned television" (quoted in Leary and Donnellan 2012, p.56).

The colors, lighting, and organization of space in many classroom and school environments can negatively impact autistic bodies in other ways. For example, for many neurotypical children, large spaces like auditoriums or cafeterias are places to be loud and expressive. They feel liberated when they are in these spaces after spending much of their day sitting still and being quiet in the classroom. However, autistic children often find them overwhelming and uncomfortable. Similarly, things like cramped hallways (which are full of noisy and excited students in-between classes), brightly colored walls, desks positioned very close to one another, long hallways without clear signs or directions, classrooms cluttered with all sorts of visually intense learning objects and other paraphernalia, loud music played during

lessons or play time, flashy educational videos, large sunny windows, and many other things are all features of that developmental niche that are biased to support neurotypical bodies and their learning needs and preferences while, at the same time, proving to be maladaptive for autistic bodies (Martin 2016).

The takeaway point is that some of the social difficulties people with ASD face aren't caused just by things going on inside their head (e.g., neurocognitive dysfunction or empathy deficits, as is often assumed). Instead, they arise *relationally*, in the way that many everyday forms of interaction and sociomaterial niches are not set up to be flexible and responsive to neurodivergent styles of embodiment and expression. These niches, and the implicit biases that are part of them, limit access to the affordances and possibilities for social participation that neurotypical bodies take for granted.

Conclusion

In this paper we argued that the psychological construct of implicit bias should be understood as *embodied perceptual habits*, or socially learned ways of engaging with the world. We then introduced the concept of the developmental niche to capture the various psychological and cultural forces that guide environmental modifications in children's learning environments. Our main claim was that some developmental niches are maladaptive in the sense of being detrimental to children's cognitive development, and that this maladaptation can be traced to embodied perceptual habits that bias developmental niche construction in certain ways. Evidence for this claim was provided by case studies with children with Down Syndrome and autism. Thus, one positive feature of our framework is that it allows us to highlight how certain kinds of injustices arise out of the way the environment is structured according to social embodied perceptual habits on the part of niche constructors.

Now, one objection that could be raised to our account is that it is not clear why we should take these embodied perceptual habits to be reconceptualizations of *implicit bias*, as it has been studied in empirical psychology.[9] After all, one diagnostic feature of implicit bias is that they are typically unresponsive to reasons, that is, that we cannot reason our way out of a bias we harbor only implicitly, a point that is corroborated by empirical research (Duguid and Thomas-Hunt, 2015). However, this does not seem to be the case with embodied perceptual habits. When a parent learns that some of their habitual responses are harming their children, they will most likely quickly change these habitual responses. This suggests that embodied perceptual habits might perhaps be a different phenomenon from implicit bias, so that we may need to keep both notions in our theory after all.

Our response to this objection is twofold. First of all, habits are sometimes stubbornly persistent even in the face of reason. Pedro might be fully aware that biting his nails is a bad habit and has a (conscious, reflective) desire to stop, but whenever he gets a bit distracted the habit kicks in again. In a similar vein, a parent of a child with Down syndrome might learn that excessively vetoing overgeneralizations may be harmful to the child's linguistic development, but still find themselves doing it, perhaps out of distraction of familiarity. Most of us have our share of bad habits, and we know from experience that it often takes time and effort to change them. So although we can reflectively decide to change a habit, reason alone will not get us out of our habitual responses. We must actively learn how to use our bodies in a new way, something that might take time and effort.

Secondly, the supposed reason-unresponsiveness of implicit bias has been called into question by a number of empirical studies. One of these studies (Brinol et al. 2009) found that presenting subjects with a strong, persuasive argument for a certain target category changed the

[9]This objection was raised by an anonymous referee.

subject's preferences for that category (as measured by the IAT), relative to a situation where a weak argument in favor of the category was presented. In another study (Gregg et al. 2006), subjects were presented with previous negative or positive evaluations of a target object, and then tested on a IAT concerning that object. Afterwards the evaluations were swapped, and the study found that IAT scores changed accordingly, with the object that was now given a more positive evaluation being favored in the IAT. This suggests that, at least in some cases, implicit bias, as the construct measured by the IAT, can change in response to reasons, which doesn't mean that they always will, as research from Duguid and Thomas-Hunt (2015) suggests. But the same may be said of embodied perceptual habits, which may sometimes change fast and easily in response to reasons, while at other times remain stubbornly persistent. To investigate how, and in what contexts, change is easy or difficult is an important and interesting question that is beyond the scope of this paper.

In addition, thinking of implicit bias as embodied perceptual habits also brings theoretical and practical advantages. Take, for example, the five desiderata laid out by Holroyd et al. (2017, p. 3) that any putative theory of implicit bias must be able to explain:

- **D1**: To distinguish implicit from explicit mental states or processes;
- **D2**: to capture interesting cases of dissonance between agents' professed values and the cognitions driving responses to these measures;
- **D3**: to formulate interventions for changing bias, or blocking discriminatory outcomes;
- **D4**: to accommodate or explain the full range of the phenomena captured by indirect measures; and
- **D5**: to gain traction in addressing problems of marginalisation and under-representation, and draw attention to complicity in these problems.

Regarding D1, a word of clarification is in order. In most psychological models put forward in the empirical literature, implicit bias is supposed to be a certain type of mental state, like a belief. This makes it possible to distinguish between beliefs that are implicit (tokened as a result of automatic conceptual associations) or explicit (tokened as a result of conscious cognitions like reflections or inferences). But if implicit biases are embodied perceptual habits, which are properties of the social world, they are not the sort of thing that can be implicit or explicit.

In our picture, then, a theory of implicit bias will not need to distinguish between explicit and implicit mental states, as stated by D1, simply because embodied perceptual habits are not mental states but properties of the social environment that are enacted by individual subjects in particular contexts embedded in larger social structures. This is compatible with Machery's proposal of "de-freuding" implicit biases by taking them to be "broad-track dispositions to behave and cognize (have thoughts, attend, emote, and so on) toward an object" (2016, p. 112), or with Haslanger's schemas as "patterned sets of dispositions in response to one's circumstances" (2008, p. 212). As long as we think of these dispositional profiles in social rather than individualistic terms, they are compatible with the view we are defending.

We may be aware of some aspects of our dispositions (or expressions of habit) and not of others, but the dispositional profile itself, or the habit, is not the sort of thing that can be either implicit or explicit. As Machery suggests (2016), what has been referred to in the empirical literature as "explicit attitudes" are actually reflective judgments *about* attitudes, rather than expressions of attitudes themselves. These judgments about our preferences in relation to objects of type *x* can be more or less accurate in respect to our embodied perceptual habits concerning *x*. Instances of inaccuracies is what accounts for dissonance between our

endorsed values towards *x* and how we enact our embodied perceptual habits in relation to *x*, which is what is expressed in D2.

Regarding D3, our proposal makes interesting predictions concerning interventions for changing biases. First of all, it is important to clarify that our view does not rely on indirect measures such as the IAT to detect embodied perceptual habits. These habits, as we said, are properties of the social environment that are enacted by individuals in a context-dependent manner and scaffolded by the social and material context in which the enactment takes place. Indirect measures may capture certain expressions of a racial embodied perceptual habit – such as slower movements to push a button that associates a photograph of a black person with a word denoting a positive quality – but it is perfectly possible to overcome this expression of habit while still enacting a racial embodied perceptual habit in different contexts in other ways.

Our view, therefore, will not put much weight on the outcome of indirect measures such as the IAT, and does not depend on their reliability and predictive validity. So rather than thinking of interventions in terms of measures that will influence one's IAT score in a positive way – for example, by recommending more exposure to portraits of famous black personalities such as Martin Luther King or Barack Obama[10] – our view suggests interventions in terms of change of habit.

In this respect, the phenomenological tradition may once again point us in the right direction. According to Merleau-Ponty, we should not think of habits as purely passive, as

[10] Dasgupta & Greenwald (2001) provide evidence that such exposure impacts one's performance in a racial IAT in a positive way (i.e., by reducing the difference in reaction time concerning photographs of black and white persons), which led Kang & Banaji (2006) to suggest that an effective intervention against racial biases would be to have more pictures of famous black personalities in offices and households. We believe these measures miss the point, and do not address structural and institutional factors that need to be taken into account in more effective interventions for changing racial biases.

dispositions which automatically "kick in" whenever we are in a certain kind of situation. Rather, habits are fundamentally active and are continuously enacted and activated. When an experienced guitarist is playing her guitar she is not simply deploying a fixed learned routine but continuously shaping and expanding the habit by enacting it in various contexts. Without activation the habit would slowly lose its grip and would no longer be enacted in such a smooth and familiar manner. Since habits have an element of activity, this opens up a space where we can enact our habits differently and thus come to change them.

For example, as we move away from medical deficit models of autism and instead speak more openly and widely of *neurodiversity*, these public narratives may have practical import in terms of shaping everyday habits and the developmental niches they generate. As they gradually internalize these narratives, non-autistic people may become more sensitive and responsive to autistic styles of movement and expression. They may recognize that stimming is an important way of negotiating shared spaces for autistic people and thus find it less off-putting; become more sensitive to how everyday environments can be modified to accommodate distinct sensory-processing needs (e.g., implementing "quiet hours" at the gym with lowered lights, quieter music, fewer people, etc.); or by demonstrating greater sensitivity to the pauses, delays, diminished eye contact, and direct speech that are part of autistic styles of social engagement. In short, they may habitually enact more inclusive niches that better mesh with the social-communicative needs of autistic people (Krueger and Maiese, 2018).

But there is a caveat. As we said above, habits are properties of the social environment, inherited and transmitted by social groups and reinforced by cultural and institutional norms and practices. As such, it is not enough for individuals to change their own perceptual embodied habits, since it is likely that this habit will persist in the social structure in which these

individuals are embedded. This invites us to think of habit change as a collective *and* interpersonal effort — again, think of neurodiversity proponents' call to shift widely-accepted metaphors and media representations of autism away from deficit frameworks to instead emphasize difference and diversity — which concerns not only how we behave as individuals but also how shared niches are constructed and how our institutions function to reinforce and transmit these habits, as well as the narratives that shape and reinforce them. If a trademark of such habits is that they are culturally and institutionally transmitted, then any intervention in habit change must disrupt transmissibility through institutional and collective change.

Regarding D4, embodied perceptual habits can unproblematically explain a wide range of cases that have been put forward in the literature as instances of implicit biases. Take, for example, the following empirical evidence for racial biases:

1. Employers tend to produce lower evaluations and fewer hiring recommendations for job candidates with typical Black American names, even when their qualifications are equivalent to white candidates (Dovidio & Gaertner, 2000)
2. Subjects in a first-person shooter task tend to shoot a black armed suspect faster than a white one, and hesitate more often to shoot unarmed suspects when they are white (Correll et al., 2002).
3. NBA referees tend to call a foul more often when black basketball players are involved relative to white players (Prince & Wolfers, 2010).

All these cases can be redescribed as enactments of racial perceptual habits, in which subjects enact socially learned ways of engaging with black persons that are markedly different from white persons. This involves perceiving them as less capable or more threatening, which is manifested in the way one skims through a resumé and interprets qualifications, reacts to a

suspect with an unknown object in their hands, or interprets bodily movements in a basketball game. Even in an apparently "mental" task such as a racial IAT, embodied perceptual habits are enacted in the speed in which one moves one's hand to push a button, which is different when photographs of black or white persons are presented on the screen. We can thus conclude that our view can easily handle D4 as well.

Finally, by taking habits to be properties of the social environment that are inherited and transmitted by social groups and reinforced by institutions, habits can advance our understanding of how material, social and epistemic goods are unevenly distributed among different social groups and how individuals belonging to these social groups, by enacting these social habits, contribute to the maintenance of privilege and benefits within their own group (D5).

Our view, then, covers the main desiderata of theories of implicit bias while avoiding the main criticisms raised by Machery (2022), which cast doubt on the indirect measurements that have been developed in the empirical literature. Since our view does not rely on the reliability or predictive validity of such measures, we are immune to these criticisms. Rather than focusing on how to detect perceptual habits through empirical tasks, the phenomenological tools deployed in our reconceptualization of implicit bias invites us to gain a deeper theoretical and practical understanding of how larger social structures determine, at least in part, our pre-reflective orientation in the world in respect to objects, persons and places of various kinds. And this reconceptualization, we hope, may prompt the ongoing creation of interventions that might change how these habits are enacted and transmitted both at an individual, collective and institutional level.

References

Ahmed, S. (2007). A phenomenology of whiteness. *Feminist Theory*, *8*(2), 149–167.

Antonarakis, S. E., Skotko, B. G., Rafii, M. S., Strydom, A., Pape, S. E., Bianchi, D. W., Sherman, S. L., & Reeves, R. H. (2020). Down syndrome. *Nature reviews. Disease primers*, *6*(1), 9.

Baron-Cohen, S. (1995). *Mindblindness: An Essay on Autism and Theory of Mind*. MIT Press.

Barnbaum, D. R. (2009). The ethics of autism: Among them but not of them. Bloomington: Indiana University Press.

Bourdieu, P. (1980/1990) *The Logic of Practice.* Stanford University Press.

Bizzari, V. (2018). Like in a Shell: Interaffectivity and Social Cognition in Asperger's Syndrome. *Thaumàzein*, 6, 158–179.

Boldsen, S. (2022b). Autism and the Sensory Disruption of Social Experience. Frontiers in Psychology, 13, 1-13.

Boldsen, S. (2022b). Material encounters. A phenomenological account of social interaction in autism. *Philosophy, psychiatry, & psychology*, 29(3), 191–208.

Brinol, P., Petty, R., and McCaslin, M. (2009) Changing attitudes on implicit versus explicit measures: What is the difference? In R. Petty, R.H. Fazio, and P. Brinol (eds), Attitudes: Insights from the New Implicit Measures. New York: Psychology Press.

Brownstein, M., Madva, A., & Gawronski, B. (2019). What do implicit measures measure? *Wiley Interdisciplinary Reviews: Cognitive Science*, *10*(5), 1–13.

Chapman, R. (2019a). Autism as a Form of Life: Wittgenstein and the Psychological Coherence of Autism. *a*, 50(4), 421–440.

Chapman, R. (2019). Neurodiversity Theory and Its Discontents: Autism, Schizophrenia, and the Social Model of Disability. In Ş. Tekin & R. Bluhm (Eds.), *The Bloomsbury Companion to Philosophy of Psychiatry*. Bloomsbury Collections, 371-390.

Chapman, R., & Carel, H. (2021). Neurodiversity, Epistemic Injustice, and the Good Human Life. Journal of Social Philosophy, *53*(4), 614-631.

Clark, A., & Chalmers, D. (1998). The Extended Mind. *Analysis*, *58*(1), 7–19.

Colombetti, G., & Krueger, J. (2015). Scaffoldings of the affective mind. *Philosophical Psychology*, *28*(8), 1157–1176.

Coninx, S. (forthcoming) The Dark Side of Niche Construction. *Philosophical Studies*.

Correll, J., Park, B., Judd, C. M., & Wittenbrink, B. (2002). The police officer's dilemma: Using ethnicity to disambiguate potentially threatening individuals. *Journal of Personality and Social Psychology*, 86, 1314–1329.

Dasgupta, N., & Greenwald, A. G. (2001). On the Malleability of Automatic Attitudes: Combating Automatic Prejudice With Images of Admired and Disliked Individuals. *Journal of Personality and Social Psychology*, *81*(5), 800–814.

Dawkins, R. (1976) *The Selfish Gene*. Oxford University Press.

De Jaegher, H. (2013). Embodiment and sense-making in autism. *Frontiers in Integrative Neuroscience*, 7(15), 1–19.

Doan, M., & Fenton, A. (2013). Embodying Autistic Cognition: Towards Reconceiving Certain "Autism-Related" Behavioural Atypicalities as Functional. In J. L. Anderson & S. Cushing (Eds.), *The Philosophy of Autism*. NewYork: Rowman and Littlefield Publishers, 47-72.

Donnellan, A. M., Hill, D. A., & Leary, M. R. (2012). Rethinking autism: implications of sensory and movement differences for understanding and support. *Frontiers in Integrative Neuroscience*, 6(124), 1–11.

Dovidio, J. F., & Gaertner, S. L. (2000). Aversive Racism and Selection Decisions: 1989 and 1999. *Psychological Science*, *11*(4), 315–319.

Duguid, M. M., & Thomas-Hunt, M. C. (2015). Condoning stereotyping? How awareness of stereotyping prevalence impacts expression of stereotypes. *Journal of Applied Psychology, 100*(2), 343–359.

Fabry, R. E. (2021). Limiting the explanatory scope of extended active inference: The implications of a causal pattern analysis of selective niche construction, developmental niche construction, and organism-niche coordination dynamics. *Biology and Philosophy*, *36*(1), 1–26.

Fitzgerald, J., Roberts, J., Pierce, P., & Schuele, M. (1995). Evaluation of Home Literacy Environment: An Illustration With Preschool Children With Down Syndrome. *Reading & Writing Quarterly*, *11*(4), 311–334.

Flynn, E. G., Laland, K. N., Kendal, R. L., & Kendal, J. R. (2013). Target article with commentaries: Developmental niche construction. *Developmental Science*, *16*(2), 296–31.

Frizelle, P., Allenby, R., Hassett, E., Holland, O., Ryan, E., Dahly, D., & O'Toole, C. (2022). Embedding key word sign prompts in a shared book reading activity: The impact on communication between children with Down syndrome and their parents. *International Journal of Language and Communication Disorders*, *June*, 1–17.

Furman, T. M., & Tuminello, A., Jr. (2015). Aristotle, Autism, and Applied Behavior Analysis. *Philosophy, Psychiatry, & Psychology*, 22(4), 253–262.

Gauvain, M. (1995). Thinking in Niches: Sociocultural Influences on Cognitive Development.

Human Development, *38*(1), 25–45.

Gawronski, B., & Bodenhausen, G. V. (2011). The associative-propositional evaluation model. Theory, evidence, and open questions. In *Advances in Experimental Social Psychology* (1st ed., Vol. 44). Elsevier Inc.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology*, *74*(6), 1464–1480.

Gregg, A.P., Seibt, B., and Banaji, M.R. (2006) Easier done than undone: Asymmetry in the malleability of implicit preferences. *Journal of Personality and Social Psychology*, 90(1): 1–20.

Gross, Z. (2012). Metaphor Stole My Autism: The Social Construction of Autism as Separable from Personhood. In J. Bascom (Ed.), *Loud Hands: Autistic People, Speaking*. The Autistic Press.

Haslanger, S. (2008). Changing the Ideology and Culture of Philosophy: Not by Reason (Alone). *Hypatia*, *23*(2), 210–223.

Holroyd, J., Scaife, R., & Stafford, T. (2017). What is implicit bias? *Philosophy Compass*, *12*(10), 1–18.

Hickey, A., Crabtree, J., & Stott, J. (2018). "Suddenly the first fifty years of my life made sense": Experiences of older people with autism. *Autism: The International Journal of Research and Practice*, 22(3), 357–367.

James, W. (1890/1950) *The Principles of Psychology, vol. 1*. Dover Publications.

Kang, J., & Banaji, M. R. (2006). Fair measures: A behavioral realist revision of "affirmative action." *California Law Review*, *94*(4), 1063–1118.

Karmiloff-Smith, A. (2009). Nativism Versus Neuroconstructivism: Rethinking the Study of Developmental Disorders. *Developmental Psychology*, *45*(1), 56–63.

Kidd, I. J., & Carel, H. (2018). Healthcare practice, epistemic injustice, and naturalism. In S. Barker, C. Crerar, & T. Goetz (Eds.), *Harms and Wrongs in Epistemic Practice*, Cambridge University Press, 211–233.

Krueger, J. (2013). Ontogenesis of the socially extended mind. *Cognitive Systems Research*, 25-26, 40–46.

Krueger, J. (2021). Enactivism, other Minds, and mental Disorders. *Synthese*, 198(Suppl 1), 365–389.

Krueger, J. (2021b). Finding (and losing) one's way: autism, social impairments, and the politics of space. *Phenomenology and Mind,* 21, 20–33.

Krueger, J., & Maiese, M. (2018). Mental institutions, habits of mind, and an extended approach

to autism. *Thaumàzein*, 6, 10–41.

Krueger, J., Osler, L. & Roberts, T. (2023). Loneliness and Absence in Psychopathology. *Topoi*. https://doi.org/10.1007/s11245-023-09916-3

Laland, K., Odling-Smee, J., & Feldman, M. (2000). Niche construction, biological evolution, and cultural change. *Behavioral and Brain Sciences, 23*(1), 131-146.

Leary, M. R., & Donnellan, A. M. (2012). Autism: Sensory-Movement Differences and Diversity. Cambridge Book Review Press.

Leboeuf, C. (2020). The Embodied Biased Mind. In E. Beeghly and A. Madva (Eds.), *An Introduction to Implicit Bias: Knowledge, Justice, and the Social Mind* (pp. 41–56). Routledge.

Lipson, S. K., Zhou, S., Abelson, S., Heinze, J., Jirsa, M., Morigney, J., Patterson, A., Singh, M., & Eisenberg, D. (2022). Trends in college student mental health and help-seeking by race/ethnicity: Findings from the national healthy minds study, 2013–2021. *Journal of Affective Disorders*, *306*, 138–147.

Machery, E. (2022). Anomalies in implicit attitudes research. *Wiley Interdisciplinary Reviews: Cognitive Science*, *13*(1), 1–15.

Maiese, M. (2016). Affective Scaffolds, Expressive Arts, and Cognition. *Frontiers in Psychology,* 7, 359, 1-11.

Martin, C. S. (2016). Exploring the impact of the design of the physical classroom environment on young children with autism spectrum disorder (ASD). *Journal of Research in Special Educational Needs: JORSEN*, 16(4), 280–298.

Menary, R. (2007). *Cognitive Integration: Mind and Cognition Unbounded*. Palgrave-Macmillan.

Merleau-Ponty, M. (1945/2002) *Phenomenology of Perception*. Routledge.

Odling-Smee, F.J., Laland, K.M., & Feldman, M.W. (2003) *Niche Construction: The Neglected Process in Evolution*. Princeton University Press.

Pellegrini, A. D., Perlmutter, J. C., Galda, L., & Brody, G. H. (1990). Joint Reading between Black Head Start Children and Their Mothers. *Child Development*, *61*(2), 443–453.

Pellicano, E., & Stears, M. (2011). Bridging autism, science and society: moving toward an ethically informed approach to autism research. *Autism Research*, 4(4), 271–282.

Price, J. and Wolfers, J. (2010) Racial discrimination among NBA referees. The Quarterly Journal of Economics, 125(4): 1859–1887.

Ricci L. (2011). Home literacy environments, interest in reading and emergent literacy skills of children with Down syndrome versus typical children. *Journal of intellectual disability research : JIDR*, *55*(6), 596–609.

Rowlands, M. (2009). Extended cognition and the mark of the cognitive. *Philosophical Psychology*, *22*(1), 1–19.

Schilbach, L. (2016). Towards a second-person neuropsychiatry. *Philosophical Transactions of the Royal Society of London*. Series B, Biological Sciences, 371(1686), 20150081.

Skotko, B. G., Levine, S. P., Macklin, E. A., & Goldstein, R. D. (2016). Family perspectives about Down syndrome. *American Journal of Medical Genetics Part A*, *170*(4), 930–941.

Slaby, J. (2016). Mind Invasion: Situated Affectivity and the Corporate Life Hack. *Frontiers in Psychology*, *7*(February), 1–13.

Sterelny, K. (2010). Minds: Extended or scaffolded? *Phenomenology and the Cognitive Sciences*, *9*(4), 465–481.

Stevenson, S. (2007). (M)Othering and Autism: Maternal Rhetorics of Self-Revision. In M. Osteen (Ed.), *Autism and Representation*, Routledge, 197–211.

Stotz, K. (2010). Human nature and cognitive-developmental niche construction. *Phenomenology and the Cognitive Sciences*, *9*(4), 483–501.

Super, C. M., & Harkness, S. (1982). The infant's niche in rural Kenya and metropolitan America. In L.L. Adler (Ed.), *Cross-cultural Research at Issue* (pp. 47-55). Academic Press.

Super, C. M., & Harkness, S. (1986). The developmental niche: A conceptualization at the interface of child and culture. *International Journal of Behavioral Development*, *9*(4), 545–569.

Tanesini, A. (2022). Scaffolding Knowledge. *Philosophical Issues*, 1–15.

Timms, R., & Spurrett, D. (2022) Hostile Scaffolding. Unpublished Manuscript. University of KwaZulu-Natal.

van Grunsven, J. (2020). Perceiving “Other” Minds: Autism, 4E Cognition, and the Idea of Neurodiversity. *Journal of Consciousness Studies*, 27(7-8), 115–143.

Van Herwegen, J., Ashworth, M., & Palikara, O. (2018). Parental views on special educational needs provision: Cross-syndrome comparisons in Williams Syndrome, Down Syndrome, and Autism Spectrum Disorders. *Research in developmental disabilities*, *80*, 102–111.

West, M. J., & King, A. P. (1987). Settling nature and nurture into an ontogenetic niche. *Developmental Psychobiology*, *20*(5), 549–562.

Young, I. (1980). Throwing like a girl: A phenomenology of feminine body comportment, motility, and spatiality. *Human Studies*, 3(1), 137–156.