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4E Cognition: Aesthetics, Ecology and Beyond

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Embodiment and Aesthetics: Cognition Going Wider

Two years ago, in 2018, a long-awaited publication saw the light: *The Oxford Handbook of 4E Cognition*, edited by Albert Newen, Leon De Bruin, and Shaun Gallagher. In the words of Tom Froese, a contributor to the volume, such an important collection of articles and critical notes just a few pages shy of one thousand having found a collective place with a highly prestigious publisher "ma[de] the field of '4E Cognition' *official*" (emphasis added).

But what is this field like? What kind of scholars is involved? Mostly, it is philosophers, psychologists, and cognitive scientists who are interested in the idea of why and how thinking is, so to speak, never *only* thinking. More explicitly, what unites scholars interested in 4E Cognition is the notion that, at least in some (but not infrequent) cases, mental processes are dependent, at different degrees, on extra-cranial and/or extra-bodily factors. This notion is almost on the whole antithetical to the fundamental tenets of classical cognitive science, which conceives the human mind as a substantially disembodied software controlling a hardware, i.e. the body.

Despite the large-scale recognition granted by the *Oxford Handbook*, however, the label '4E' (which canonically stands for embodied, embedded, extended, enactive) is problematic in its own right. Its 'numerical' character suggests the presence of a fragmented plurality of positions among its proponents. This is actually the case. The main problem is that the different E's are not always brought together in perfect harmony or not even compatible at all. Radical Enactivism, for instance, is at odds with the extended mind model on the thorny issue of internal mental representations as well as on the computationalist account of the mind. In general, there is continuity and dialogue between the proponents of these cognate approaches, yet points of disagreement persist.

On the top of all that, sometimes it is not even clear which E's are the right E's or the ones represented by the label. In fact, some advocate a 3E Cognition, leaving aside Andy Clark's extended mind paradigm (for example, Scarinzi in this volume), whereas others include the Gibsonian 'ecological' cognition approach among the four, again at the expenses of the Extended-E. The very term 'embodied' has different traditions of usage: while most of the times it serves as the lowest common denominator for all of the E's (despite being one of them, curiously), in other contexts it may have narrower meanings (see Larry Barsalou's grounded cognition, which sees embodiment as a part of its overall proposal).

These hardly irrelevant differences notwithstanding, what really makes all of the E's hold a common position within contemporary philosophical psychology is their opposition to a number of theses of former cognitivism and classical cognitive science. More or less strongly, the embodied mind is not seen as always intra-cranial and always representational, as the orthodoxy of cognitive science would maintain. Or, more generally, the mind is not seen analogically as the biological version of a computer.

The first, obvious, reason for us to choose the topic of the philosophy of embodiment is that it belongs in several different ways to the interests of our journal, which focuses on the philosophy of mind as well as on aesthetics and the philosophy of language. But there is also a second, more general, reason. As the publication of the *Oxford Handbook* demonstrates, not only is embodiment a theme that cannot be any longer ignored or dismissed, but it presents itself as more compelling than ever. Not solely for its philosophical weight *per se* – as it poses many difficult challenges to the mainstream cognitivism – but also for its important implications for robotics, AI, education, and ethics. Besides, insisting on this theme appears to be more crucial than ever in light of the institutional and theoretical crisis of the research programme of cognitive science described by Núñez et al. (2019).

This composite movement is undoubtedly plural and likely in need of a higher degree of unification, if it aims to become even more recognized worldwide, and with full dignity. Certainly, further theoretical steps are still necessary to fulfil the promises that 4E Cognition has made to psychologists and cognitive scientists – not to mention the problem of an empirical embodied cognitive science, which is in many respects yet to come. In conclusion, we feel that giving space to such a vibrant multidisciplinary field can offer valuable food for thought to our readers.

It is important – continuing the metaphor – to further highlight that this mental nourishment is not one-sided, but rather a varied diet. The essays gathered here are evidence of how broad and heterogeneous the field of 4E Cognition research is, on a (synchronic) cross-disciplinary level as well as on a (diachronic) historical-philo-

sophical one: the problems it raises and the themes it discusses go far beyond those strictly pertaining (or believed to strictly pertain) to the cognitive sciences and the philosophy of mind as they have evolved in recent decades.

Indeed, the current debate confronts, both positively and negatively, a long tradition of thought dating back, at least, to the beginnings of modernity. It is not by any chance that the so-called 'Cartesian paradigm' lies often in the background and acts as a critical reference point for the essays in this collection and, more generally, for much of the contemporary scholarly literature on mind and cognition. We said "both positively and negatively" to emphasize that the contemporary debate does not just (negatively) oppose, for instance, the Cartesian and post-Cartesian mind/body dualism, but it also (positively) revives the interest that several modern philosophers and thinkers took in the spheres of sensitivity, affectivity etc., notably during the seventeenth century (just think of Leibniz) as well as in the dense and still partly underexplored age of the Enlightenment.

Moreover, we cannot avoid noticing that when modern philosophy dealt with the problem of mind (and body) it did so without worrying about disciplinary distinctions or boundaries: if a problem was a philosophical problem, that was because it was a physical, psychological, and (maybe) ethical (and aesthetic) problem as well. In relation to this, the multidisciplinarity that characterizes the philosophy of embodiment is – perhaps to the surprise of those who cultivate a unilateral vision of modernity – more a revival than a radical novelty. This does not deny that contemporary multidisciplinarity occurs at a stage where the various disciplines have experienced a large and extensive development towards sectoral specialization – hence the difficulties, but also the great challenges that a multidisciplinary approach poses to scholars and researchers.

Yet, as the contributions to this issue show, this multidisciplinarity has very vast and porous boundaries: if the mind and cognition extend beyond the brain to include the body and the environment, it is evident that studying the mind and cognition is studying, and not in a merely subsidiary way, everything involving or concerning the body and the environment – starting from experiences that can be described as aesthetic-and-affective and experiences that arise from interactions with the physical and sociocultural environment.

Actually, with respect to the wide range of themes and problems involved, the essays collected here give preference to those issues that have to do mainly with aesthetics – both in the sense of philosophy of sensitivity and affectivity and in the narrower sense of philosophy of art – and with ecology – understood as the study of interactions with the environment and as the discipline questioning the very idea of environment. Two things are worth pointing out here. First, the convergence on the aesthetic-and-affective was not planned by

the editors but arose from the thematic choices of the authors; and this is perhaps to indicate that the dimensions of sensitivity, affectivity and aesthetic experience are deemed (the most) particularly urgent and theoretically relevant today – almost as if an 'AE' standing for 'aesthetic' should inevitably be added to the canonical E's that overall connote the philosophy of embodiment. Second, for 4E Cognition scholars the environment is a specific research theme, and furthermore, so to speak, a sort of *fil rouge* that (inter)connects and unites all the terms of the problem: mind, body, and environment. In other words, for these scholars the mind is *in* an environment, and it is *itself* an environment.

From the 4E perspective, and especially from the enactive standpoint, which is the one chiefly addressed by the essays collected in the present issue, aesthetic and ecological approaches to mind (and cognition) are fundamental: for, shall we say, the mind (and cognition) is *already* affectivity and environment. This can also make us understand that aesthetic and ecological questions are important not merely because they are "applications of 4E principles, but because answers to these questions have the potential to loop back into theory and to challenge already formulated principles" (Newen, De Bruin, Gallagher 2018, 13). What 4E scholars think they can find in aesthetics and ecology is an improvement of the theory, not only a test-bench for its possible confirmation.

The first of the essays in this issue is entirely devoted to aesthetics, in both the aforementioned meanings of the term. Firmly persuaded that it requires almost all the four E's to understand the great variety of aesthetic experiences, in their "4E Cognition and the Spectrum of Aesthetic Experiences" Mia Burnett and Shaun Gallagher develop a pre-eminently enactive, affordance-based approach to art and aesthetic matters. In particular, they claim that

> an orientation around affordances [as it is in the enactive theories] rather than tools [as in the extended mind analysis of art] [...] is the first principle of a positive account of art [and aesthetics] in a 4E cognition framework. (*infra*, 165)

Therefore, embracing enactivism in the idea that embodiment and culture are integrated to form a whole, the authors propose to regard aesthetic experience as a "double attunement" toward the objects: immediate and affective, re-organisational and reflective at once. In their words, within a 4E perspective "[b]ody, brain and environment form one system in which aesthetic experience can be simultaneously and variously characterized as sensory-motor, affective, cultural and cognitive" (*infra*, 173).

The aesthetic domain, with its dual character, is the well from which Anna Boncompagni also draws on. Her "Enactivism and Nor-

mativity. The Case of Aesthetic Gestures" offers an analysis (which aims to be ultimately a philosophical one) of some conceptual difficulties that enactivists face in discussing normativity, namely that of "accounting for normativity while avoiding overly reductionist outcomes" (*infra*, 177). Reviewing some valuable, enlightening insights of Wittgenstein and the pragmatists, Boncompagni suggests that aesthetic gestures of appreciation and disapproval (found to be natural and cultural at the same time) could be considered as the paradigmatic cases of enacted normativity. Since these gestures "could help characterize human cognition as intrinsically enactive *and* normative" (*infra*, 191), it is worth, for enactivists, working on them in order to provide a thoroughly untainted-by-reductionism account of normativity.

Carlos Vara Sánchez's "Raw Cognition. Rhythms as Dynamic Constraints" also addresses the enactive view. More precisely, Vara Sánchez holds that a concept of rhythm based on entrainment (which is akin to Dewey's, but whose earliest roots are traced back to Archilocus) and not on order and repetition (a notion of rhythm that, instead, is due to Plato first) can be a useful item for enactive approaches to cognition. This – he argues – for the very reason that such a concept "allows us to think of the different oscillators that we find in the body, brain, and environment as parts of nested dynamic constraints" (*infra*, 196) modulating cognition in a way that is not linear: bodily, brain and environmental rhythms mutually interact so as to entrain and be entrained into a global cognitive rhythm.

As stressed above, many of our interactions within the physical and social world are characterized by the presence of a powerful watermark: affectivity, which plays an important role in our everyday lives, and not only from a private, introspective point of view, as the driver of many of our actions. With the essay "Emoting the Situated Mind. A Taxonomy of Affective Material Scaffolds", Giovanna Colombetti goes in the direction of systematizing the relatively untouched (pun intended) territory of artifacts when they function as scaffolds for affectivity. Her proposed taxonomy of affective artifacts directly rearranges the one compiled by Richard Heersmink (2013), which originally regarded cognitive artifacts. While there is conceptual overlapping between the sub-categorization of these two ways in which artifacts can interact with human agents, a number of differences still arise. In sum, "objects are complex things which can affect us in many different ways in virtue of their material properties as well as of what we take them to refer to", an ability granted by the "historical and enculturated" (*infra*, 233) character of human cognition.

The last essay of this issue addresses a debated topic within the 4E scientific community we hinted at earlier: how many E's are really needed by the new embodied cognitive science? In her "4E's Are Too Many. Why Enactive World-Making Does not Need the Extended

Mind Thesis", Alfonsina Scarinzi claims that four E's are too many, while three E's (Embodied, Embedded, Enactive) would suffice in order to successfully get over Cartesian cognitivism for good. The author also further explicates her position on why exactly it should be so: enactivists can agree with her assumption, but she offers an argument different from others appeared in the past. Her argument pivots on the distinction between the embodied agent (i.e. an organism) and the environment; this distinction – argues Scarinzi – should be maintained, albeit conceived in a different manner from classic cognitive science. This conceptual background also appears to better fit with an enactive account of artifact use and sensorimotor couplings.

The Editors
Filippo Batisti,
Elena Valeri

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4E Cognition and the Spectrum of Aesthetic Experience

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Abstract We review 4E (embodied, embedded, extended and enactive) approaches to the analysis of art and aesthetic experience. We argue that extended mind analyses that focus on tool use miss important aspects, and that it requires 4 or more E's to address the broad spectrum of aesthetic experiences that correlate to the broad variety of artistic genres. We develop an enactive, affordance-based approach to understanding art and aesthetic experience. Considering both the potential and the limitations of any particular approach, we argue that there is no one unified set of principles that will make sense of all art everywhere.

Keywords Art. Aesthetic Experience. Affordance. Enactivism. Extended Mind.

Summary 1 Introduction. – 2 E Cognition. An Overemphasis on Extension. – 3 Noë's Tools that Are not Tools. – 4 The Aesthetic Spectrum. – 5 A Case Study. – 6 Conclusion.

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1 Introduction

Theories of 4E cognition include a variety of approaches – typically listed as embodied, embedded, extended and enactive, but sometimes including ecological – and do not form a unified theory. They often vary in the types of criticism they levy against more mainstream cognitivist models of the mind, and in terms of what they prioritize in their positive accounts. For example, enactivist approaches (e.g. Gallagher 2017; Hutto, Myin 2013; Thompson, Stapleton 2009), which themselves may be diverse, sometimes question aspects of the extended mind approach, such as strong notions of parity and weak notions of representation, as found in Clark and Chalmers (1998; see also Clark 2008). Extended approaches may also, by focusing on examples that emphasize functional integration with tools or instruments, oversimplify the links between mind and world that 4E researchers attempt to explore (see Slors 2019). In this respect the oversimplification concerns the reduction of the claim that perception is intrinsically pragmatic or action-oriented to the claim that in the relevant cases artifacts like tools or pieces of technology are used to scaffold or offload cognition. Such an extended approach would suggest that we should understand Gibsonian affordances (Gibson 1979) to be primarily about tool usage, eliminating other non-pragmatic types of mind-world coupling.

A number of theorists have employed an extended mind paradigm in their analysis of art and aesthetic experience. For example, Joel Krueger (2014) suggests that

> we perceive [music] as a resource we can *use* to do different things, much the same way we perceive tools and technologies as resources that help us accomplish different tasks. Music, I suggest, is experienced as having *instrumental* value. And what I suggest further is that musical affordances are what specify the different sorts of things we can do with music. (See also Cochrane 2008; Kersten 2017; Kersten, Wilson 2016; emphasis in the original)

In this paper we will review some of these accounts as we attempt to understand what 4E approaches more generally, and enactivist accounts more specifically, can contribute to aesthetics, presenting double attunement as a way to characterize the continuity that can exist between the everyday experience and the aesthetic experience. It may be that 4 or more E's are required to address the broad spectrum of aesthetic experiences that correlate to the broad variety of artistic genres. It's not clear that there is any one unified set of principles that will make sense of all art everywhere. In that respect it's important to understand both the potential and the limitations of any particular approach. Our aim is not to carry out that full anal-

ysis here, but to focus on some limitations of an extended mind approach, and some potential in a more enactive approach.

2 E Cognition. An Overemphasis on Extension

A distinction between tool-based affordances and what we might call non-instrumental affordances is somewhat difficult to appreciate if we confine ourselves to human artifacts that are clearly used precisely as tools, such as the perennial Heideggerian example of a hammer. The distinction is somewhat more pronounced when we consider other artifacts that may not have a clearly instrumental purpose, such as works of art, or non-artifacts such as events, the natural world, or other people. The latter categories offer clearer room for a distinction between tool and affordance. Our immediate affordance-relative experience of the apple tree might be shaped by our ability to eat from the tree, climb it, sit beneath it, and so on, but that does not mean that the apple tree itself has been reduced to a tool that allows for such actions. Interaction with other people likewise cannot be reduced to tool usage, even if the affordances that others offer us are crucial in shaping our initial social perceptions. Social interaction is also a special case in that in addition to what one person affords another, we have the possibility of the reversibility of this affordance, and the possibilities of group agency mediated by various cultural practices. Such experiences are complex and involve embodied and environmental, including social, cultural and normative factors. Extended models of cognition, however, are characterized by 1) a prioritization of extended explanations of cognition that often do not include or that de-prioritize embodied and enactive modes of explanation (see, e.g. Clark 2003), and 2) a strong 'active externalism' (Clark, Chalmers 1998) focused on the practical use of artifacts, equipment, or tools, rather than an 'explanatory externalism' that may be more common in other types of 4E accounts (Myin, Veldeman 2011). An active externalism alone, however strong, is theoretically insufficient for the other E's of 4E cognition.

Myin and Veldeman (2011) follow Clark and Chalmers in defining active externalism as the claim that features of the environment constitute cognition, based on their functional parity with internal processes. By focusing on the parity principle, Clark and Chalmers explain cognition as constituted by processes that unfold via external means (such as notebooks, sketchpads, pen and paper) but are functionally equivalent to internal processes. This may allow the environment to be something more than a set of mere tools, but when the environment enters into their account, it tends to take on the status of a tool, an aspect of an extended cognitive apparatus. In contrast to active externalism, Myin and Veldeman define a second type of ex-

ternalism that is common in 4E cognition accounts, which they label "explanatory externalism" (following Hurley 2010). Explanatory externalism allows for more nuanced explanations of the ways in which cognition is constituted or scaffolded by one's environment, whereas active externalism is more easily reduced to an instrumentalist approach focusing on artifact or tool use, given its emphasis on how the environment is taken into account as a cognitive apparatus. Explanatory externalism broadens and diversifies the ways in which cognition can be constituted by the environment by not limiting said environment to an extension of a cognitive apparatus per se. For this reason Myin and Veldeman find that explanatory externalism can offer a more complete account for the perception and creation of art, since art likewise is not fully explained in pragmatic terms that focus on useful artifacts or tool usage.

> Broadly, the core idea here is that a current cognitive or mental phenomenon is partly constituted by environmental factors, if these environmental or external (rather than internal) factors, through their role in the past or the present are necessary to explain why the cognitive or mental phenomenon is what it is. (Myin, Veldeman 2011, 62)

Explanatory externalism thus allows explanations that take seriously a diversity of affordance relationships in accounting for cognition, while not limiting the scope of what constitutes cognition to online functional integration processes that are patterned on tool use. This expansive account allows a wider range of possibilities that can include the embodied, embedded and enactive nature of particular cognitive processes, such as aesthetic experience or the appreciation of art. Myin and Veldeman emphasize the situatedness of art and art appreciation, noting that a more amplified externalism, such as explanatory externalism, assists in accounting for "the fact that art creation essentially involves both material things as well as a tradition, the interaction of which it owes its identity to" (Myin, Veldeman 2011, 67). A shift towards explanatory externalism does not reject active externalism, but broadens what can be included in explanations of cognition. Myin and Veldeman thus suggest that "active externalism seems to be particularly well placed to do justice to the concrete material circumstances of perceiving [as well as to producing] art" (2011, 76), and they give a number of examples. But art involves more than artifacts and material circumstances. Accordingly, explanatory externalism includes the idea that tool usage is just one aspect, to be supplemented by other external factors that explain how it is that the phenomenon is what it is more broadly, especially in light of cultural practices.

Ted Nannicelli, in his article "Aesthetics and the Limits of the Extended Mind" (2019), helps to push forward the discussion be-

tween 4E theory and aesthetics. He also points out the limitations of an extended model of the mind when it comes to how such a model, in his view, ultimately fails to explain art. Nannicelli makes an important point in noting that many externalist models of the mind fail to adequately assess aesthetic experience. We note this, however, with two caveats. First, what Nannicelli is in fact responding to is what Myin and Veldeman call active externalism. For example, he focuses critically on active externalist accounts, and references Tom Cochrane's discussion of jazz improvisation as extended cognition, where Cochrane makes a central claim focused on the use of musical instruments:

> At every level of creative decisions the musician and his instrument form a single tightly coupled system [...]. Thus when completing the cognitive task of choosing what exact notes to play, the instrument is part of an extended loop between the musician's brain, the muscles in his hands or lips, and the keys of the instrument. (Cochrane 2008, 333; cited in Nannicelli 2019, 83)

Second, Nannicelli's analysis of extended cognition is framed as a criticism of 4E models of artistic experience more generally. He raises doubts about even "the more modest of 4E theses" (2019, 93), albeit with some endorsement of specifically embodied approaches.[1] If, however, as we are suggesting, his emphasis on tool-based extension in active externalist accounts is at the expense of more complex kinds of embodied and enactive coupling, then Nannicelli's criticism may be overstated. Specifically, we note, he makes no mention of the potential for an enactivist contribution to the musically extended mind.[2]

3 Noë's Tools that Are not Tools

Although Alva Noë's work may be characterized as a version of enactivism that emphasizes sensory-motor contingency, he leans heavily on the externalism component of the research programme. One can

1 Nannicelli writes: "4E theorists have yet to offer a convincing case for how their approaches improve upon the understandings of artistic creation and appreciation developed in the traditional humanistic disciplines like philosophical aesthetics" (2019, 93-4). Yet in the same article he briefly notes the value of some embodied aesthetics approaches, for example, Richard Shusterman's concept of "somaesthetics".

2 Although Nannicelli does cite Myin and Veldeman (2011), he focuses on their *active* externalist account but ignores their discussion of explanatory externalism with respect to art. We also note that Nannicelli mentions Joel Kreuger's work on musical experience only in passing. Although Kreuger (2014) offers what he calls an account of the "musically extended mind", his analysis is closer to an enactivist account focused on affordances and embodied affectivity rather than pragmatic tool use.

read Noë as attempting to establish an account of an extended, active externalism focused on tool use that can appropriately account for art and aesthetic experience in his recent book *Strange Tools. Art and Human Nature* (2015). To do this, Noë establishes a variation of active externalism in which certain tools and practices resist our perpetual tendency to offload cognition onto them, and this resistance re-organizes and reveals the world and our more basic practices to us. On the one hand, one might read Noë's insistence on art's impractical "subversion of function" (2015, 98) in opposition to an active externalism that might frame art in terms of tool-based practicality. On the other hand, as Matthen (2016) suggests, Noë indicates that the function of some tools is to resist being useful as tools, and that this resistance itself fulfils the purpose of the tool. This ambiguity is left unresolved in Noë's work. Furthermore, there is good reason to question the rigidity of beginning with a tool-oriented framework when we can avoid this aporetic appraisal of art as a tool-that-is-not-a-tool by moving from a potentially more generalizable, more enactive notion of affordance. Rather than making the purpose of art the central question, the question, we suggest, should be about the possibilities that are afforded to a beholder by a work of art.

The change from a tool-oriented framework to a wider affordance-oriented one has downstream effects when it comes to Noë's division between organizational activities and re-organizational practices. Noë, in an explanation of human behaviour that is fundamentally centred around tool use, divides human behaviour into two categories: organizational activities and re-organizational practices. Noë explains that organizational activities are basic activities that are done due to basic biological motivations, which establish or maintain a certain type of relationship between the organism and its environment. Noë's default example, presumably for its clear biological relevancy, is breast-feeding. This activity, and other basically biological activities are lumped together with unreflective activities that we do out of habit, including, oddly, activities such as driving (Noë 2015, 7-8).

There are six features that such organizational activities have in common according to Noë: their primitivity, their skill structure, their temporality, their dyadic nature, their functionality, and their hedonic possibilities, i.e. the possibility that they can result in pleasure. These features allow Noë to link organizational activities to tool use. "Roughly, a tool (such as a computer or a hammer) is the hub of organized activity" (2015, 19). This connection leads him to what might seem to be a strange suggestion, that "breast-feeding, really, is a kind of primitive technology" (19).[3] Even some activities that other philosophers would want to label 'higher-order', such as conversation,

3 For Noë, "strange" is good; philosophy, like art, is understood as a strange tool.

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get included in this unreflective category. While conversation may be natural (6), it is not biological in the same way that Noë considers breast-feeding biological; still, conversation is an instance of basic and habitual interaction that we are motivated to do, and through which we establish a certain relationship with our world and others.

In contrast to these basic or organizational activities, Noë frames certain human practices, notably art and philosophy, as re-organizational practices, through which we can reassess or gain a new understanding of some previously unnoticed feature of our activities, or of the self that is engaged in these activities. The precise nature of the features revealed by these re-organization practices, and what these features are features of, is unclear. To parallel the discussion of breast-feeding, Noë at times references artistic depictions of breast-feeding in Western art, such as depictions of the Virgin Mary and Christ. These artistic depictions constitute, for Noë, a re-organizational practice that allows for revelations about this more basic activity.

Organisational activities are built around tools and technologies, despite the fact that many ways that we engage with the world and with others are not reducible to tool use. Re-organizational practices are built around *strange* tools, which is to say, tools that resist an easy adoption into our cognitive systems, and in this resistance they question precisely the role that functionality plays in these more typical organizational activities.

> Technology serves ends. Art questions these very ends. Art affords revelation, transformation, reorganization: art puts into question those values, rules, conventions, and assumptions that make the use of technology possible in the first place. (Noë 2015, 64)

Noë's strict division between activities and practices, as has been noted by commentators on *Strange Tools*, perhaps inadvertently perpetuates a standard of art that conveniently includes much of modern Western art, while excluding some premodern, and non-European art, or the aesthetic contributions of women (e.g. Eaton 2017; see also Noë 2015, 103-4). Art that is functional in nature (either through its religious function (such as the communication of a story to an illiterate populace) or through its ability to be also used as a tool (e.g. a decorated pot) is no longer a strange tool in that it no longer appropriately questions or causes reflection about functionality. A clay pot that has been decorated, while it might be aesthetically pleasing, does not resist integration into our cognitive functioning the way a painting does. Rather, we might be appreciative of the aesthetic qualities and then proceed to use the pot as it was made to be used.

Given Noë's strict dividing line between the basic necessities of organizational activities and the luxurious re-organizational practices,

it is no surprise that the contributions that women have traditionally been able to make to their culture, such as tending to children and preparing food, are reduced to practices that are merely biological, thus denying that these practices can permit a re-organizational reflection of utility, or that the aesthetic value that they offer is sufficient for them to appropriately be considered art. Noë's account inadvertently starts from a place that is not inclusive of some forms of art – precisely those forms of art that have been historically excluded from Western philosophical frameworks. Indeed, tools and strange tools have been divided along lines that mark a division between biology and culture. Although this is somewhat common in philosophical discussions, it is not always a pure or presuppositionless starting point of investigation, and one can see how this division could be used to marginalize the contributions of women and non-Europeans in the area of aesthetics.[4]

Furthermore, Noë's focus on the division between biology and culture is paralleled by a similar 'lower' and 'higher' process division that encourages bottom-up or top-down descriptions of cognitive processes rather than more nuanced accounts that reject this hierarchical ordering to begin with. Noë, to some extent, sees himself as critiquing precisely this ordering in his response to evolutionary theory and neuroaesthetics which reduce artistic practices to explanations that only have to do with their evolutionary grounding or neurological causes and effects. Despite the fact that he would most likely characterize his approach as rejecting a strict bottom-up or top-down approach, his emphasis on a division between activities (which use tools) and practices (which use strange tools), and in which practices are artistic by virtue of their lack of biological utility, further perpetuates the problem of a strict division between 'higher' and lower' cognition. Enactivism proposes to rethink these divisions between 'higher' and 'lower' cognition, and between culture and biology. Enactivism in this regard contrasts with approaches that attempt to explain how 'higher-order' cognition supervenes upon and reuses the mechanisms that make possible more basic practices. Relevant for discussions of aesthetics, one might think of how empathy in response to artwork is sometimes explained as based on the activation of mirror neurons (e.g. Freedberg, Gallese 2007). In contrast, enactivists think of cultural factors as highly integrated with embodied practices. This idea is supported by empirical studies by Soliman and Glenberg (2014) that show how cultural factors shape body-schematic processes in joint action. As they propose:

4 We agree, however, with Eaton (2017, 228) that Noë would "eschew any explicit devaluation of women's and indigenous people's artifactual production, and that he does not mean his conception of art to run afoul of the problems just mentioned". Eaton also raises an important question about the relation of Noë's view to John Dewey's rejection of the art versus craft distinction.

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> [C]ulture enters the scene not as a self-contained layer on top of behavior, but as the sum of sensorimotor knowledge brought about by a bodily agent interacting in a social and physical context. As such, culture diffuses the web of sensorimotor knowledge, and can only be arbitrarily circumscribed from other knowledge. (Soliman, Glenberg 2014, 209)

If we consider cultural practices and embodied sensory-motor processes, not as higher and lower, but as more fundamentally integrated to begin with, we can shift to a framework where these processes are not modular or distinct, but instead influence and permeate one another (see, e.g. Hutto et al. forthcoming).

We note that Noë's own paradigm example of the natural and biological in *Strange Tools*, namely, breast-feeding, is a practice that varies according to culture in terms of significance, duration and cultural norms. Contrary to Noë's assertion that behaviour during breast-feeding is "not [something] mothers learn or are taught" (2015, 4), there is clear anthropological evidence to suggest that this practice is frequently explicitly taught to young mothers. Indeed, it is a practice that is most successful when it is taught to the mother in question (see Locke 2012), and is situated within a broader world of practices for child-rearing and the care of families (see Wright et al 1993 for a discussion of breast-feeding practices in Diné culture).

A rethinking of Noë's distinction between organizational activities and re-organizational practices, then, would not only resolve or eliminate some of these issues, it should allow for an appreciation of the wider variety of roles that art can play. An orientation around affordances rather than tools, we suggest, is the first principle of a positive account of art in a 4E cognition framework.

4 The Aesthetic Spectrum

How can a reorientation around the notion of affordance help us to understand a continuous gradient between biological and cultural practices? What does this reorientation entail for how we explain art and aesthetic experience in the context of 4E cognition? While keeping in mind that art and aesthetic experiences do not constitute a monolith, we can explore a variety of different types of affordances that are offered through engagement with art. Specifically, we want to argue that given the diversity of the arts, ranging across plastic, performing and literary arts, as well as the design features and expressive practices anchored in everyday life, aesthetic experiences have to be understood as involving a spectrum of different affordances, which is to say that aesthetic experiences can be of a great and diverse variety.

In outlining an enactive view of aesthetic experience, one can argue that there are affective and affordance-related differences between the perception of a tool which we can pick up and use, and the perception of an artwork depicting a tool; and between an encounter with a real person and an encounter with an artwork that represents a real person. What Husserl (1989) called the "I can", or what Gibson (1979) called "affordances" are different in the case of a perception of artwork. For example, a hammer may offer an affordance for hammering while the photograph of a hammer does not. A person offers the affordance of social interaction, whereas a portrait of a person does not. Likewise, a garden may offer the possibility of taking a walk; a landscape painting does not. Clearly, artworks offer different sets of affordances. If we take this affordance-based starting point we can develop an enactivist account that is different from either the plain tool view of extended mind or the strange tool view of Noë.

An affordance is not an objective property of something in the environment; nor is it a subjective something in the perceiver, rather, it is relational, depending on both world and agent-perceiver (see Chemero 2003). If we perceive the world in terms of how we might act upon it, that's because the world offers some possibilities to us, but specifically just those possibilities related to our embodied form and sensory-motor skills. In the typical example, a chair affords sitting, but only for someone who has a body of a certain size with the right kind of bendable joints – a human, but not an elephant or an ant, can properly sit in a chair. For the elephant or the ant, the chair may offer different affordances (throwing or climbing) but not the affordance of sitting. In the case of perceiving a tool the affordance structure involves just this relationality; I perceive the tool in instrumental terms of what I can do with it (which may depend on my skill level).

There is much to say about the way affordances work in the everyday case of pragmatic, action-oriented perception, but we can also think that other non-pragmatic kinds of affordances are possible. These include, for example, attunements to what is affectively afforded, what reflective understandings are afforded, and what interactions with others are afforded. Cultural knowledge, values, and practices are integrated into perceptual and behaviural affordances (Ramstead, Veissière, Kirmayer 2016). Such affordance structures work in our perception of art in a way that problematizes an overemphasis on the tool or simple artifact model. In the case of art perception, affordances may still depend on a kind of skill. John Carvalho (2019, 25), for example, in his enactive approach to aesthetic experience, emphasizes the idea that the aesthetic appreciation of observed art – specifically painting – involves skill acquired in the practiced experience of observing art and thinking about it.

Kesner and Horáček (2017) also offer an affordance-based approach. They propose that there are primarily two types of affor-

dance permitted by art. There are aesthetic affordances, which involve the perceptual appreciation of and attention paid to the aesthetic aspects of the work without attention to context, and then there are the socio-affective/cognitive affordances which have to do with the content referenced or represented, for example, the individuals represented in a painting. In allowing for these two types of processing, aesthetic and cognitive, however, Kesner and Horáček endorse a distinction between top-down cognitive processes and bottom-up unmediated aesthetic processes. On their account, upon viewing a painting we engage top-down cognitive processes that allow us to understand the content involved, often in socio-affective ways when other human beings are depicted, and bottom-up (more sensory-based) processes that allow us to appreciate the ways in which the content is communicated (involving composition and/or the vibrancy of the contrasts in the painting etc.).

Here we can make reference to the notion of "twofoldness" that Richard Wollheim (1987) uses to characterize a double aspect of depiction in art. For Wollheim, our experience of a work of art has a twofold intentionality, or what we'll call a *double attunement*: it is a co-consciousness of what is represented in the artwork, and of the work of art as a thing involving or expressing a technique of representation. The latter would involve attention to the artwork's expressive or design and aesthetic properties. Wollheim thus emphasizes a structured kind of intentionality in which we know that we are not face-to-face with the figure represented in the painting, yet we encounter or "see-in" the painting the character portrayed. Importantly, he emphasizes, these are "two aspects of a single experience that I have […], two aspects [that are] distinguishable but also inseparable, […] [T]hey are not two experiences" (Wollheim 1987, 46).

If we follow Wollheim's idea that these are not two different experiences, but in some way are aspects of one experience, then we need a model that accounts for a more integrated perspective that, at the same time, accommodates a variety of possible aesthetic experiences.[5] Kesner and Horáček's hierarchical (top-down/bottom-up) arrangement, which divides aesthetic affordances from socio-affective affordances, risks dividing the twofold or double attunement into two separate experiences. Instead of a two-tiered model, we can expand on enactivist insights that consider embodiment and culture to be integrated, and view these double attunements as being unified in experience. Our double attunement model follows Wollheim in

5 One possible model that integrates cognitive, affective, sensory-motor and broadly considered extended factors that include cultural practices and intersubjective relations, is based on an enhanced version of what Christensen, Sutton and McIlwain (2016) call a "meshed architecture" in performance studies (see Gallagher forthcoming; Gallagher, Varga 2020).

that we find the work of art itself and an understanding of the context as it is routed in cultural practices to be unified in experience.

If the immediate aesthetic aspects of experience can be characterized as a response to the formal aspects of the work of art, involving, for example, the pleasure that the colours and layout of the piece provide the beholder, or, perhaps, the shock and uncanniness that could come about through a deliberate subversion of an artistic tradition's typical aesthetic norms, such aspects are clearly affective and not easily nor meaningfully abstracted from the content or context that is related through that work of art. This complex experiential response to the artwork can be characterized by an integrated immediacy that is akin to the experience of awe, and like awe it can motivate a more reflective experience of wonder (Gallagher et al. 2015). That is, the immediate experience of art can also make possible a more reflective (re-organizational) evaluation that can transition into a long-term response to a particular piece of art, but can also fold back into our everyday experience. In this way, it is not necessary to propose a strict separation between the types of experience, as Noë does, in order to characterize both modes of interaction with art. Like embodiment and cultural practices, there is an inseparability here that nonetheless does not reduce the aesthetic experience to the pragmatic experience.

In this respect, we should not think of the re-organizational as carrying us away from the everyday (biological, practical) organizational and into a separate realm of strange relations suggested by Noë's analysis.[6] The challenge is to see the re-organizational as re-organizational, that is, as looping back into our everyday organizational activities, rather than going off to define a separate practice. This is not to deny the strangeness of the aesthetic effect. Indeed, enactivists often point to Merleau-Ponty who, on this point, prefigures Noë's concept of art as involving a strange reflexivity.

> We live in the midst of man-made objects, among tools, in houses, streets, cities, and most of the time we see them only through the

6 Similar views of aesthetic experience have been explained in various ways by enactivist thinkers. For example, Maria Brincker's (2015) idea of the "aesthetic stance". As she puts it, an image (painting or sculpture) not only has "different affordances, but affords a sort of a 'halt' to our own ongoing environmental interactions, […] [P]erception of action as image content does not afford the perceiver an overt complimentary response beyond simply watching what is being presented" (Brincker 2015, 122-3). This is still an engagement of perceiver with the art, but an engagement of a different sort. As Brincker puts it, this is an engagement that is halted at "the edge of action" (123). This is a similar view to conceiving of aesthetic experience as involving a short-circuiting of affordances, and in some cases a re-routing of affective affordances, motivating a "response to a non-realizable (non-practical, non-interactionable) affordance, […] an opportunity for experience of the purely possible or maybe even the impossible" (Gallagher 2011, 106). The danger is that these views fail to emphasize how aesthetic practices originate in and are reintegrated into everyday activities.

> human actions which put them to use. We become used to thinking that all of this exists necessarily and unshakably. Cezanne's painting *suspends these habits of thought* and reveals the base of inhuman nature upon which man has installed himself. This is why Cezanne's people are *strange*, as if viewed by a creature of another species. (Merleau-Ponty 1964, 15-16; emphasis added)

To the extent that art can suspend our habits of thought, however, it does not do so by differentiating itself from our everyday encounters. It can reveal something different, in a way that shakes and challenges our everyday attitudes, only by maintaining a continuity with the latter. We do not claim that every aesthetic experience takes this form, but it is clearly one type of aesthetic experience that is possible. Moreover, it can be the case with the aesthetic aspects of any object, even of an object that we can otherwise put to some good use, such as a decorated pot or a lullaby. Rather than being an instance where a tool has failed to properly perform in its capacity as a tool, these opportunities for re-organizational reflection, as afforded *via* a work of art, differ from, yet in some cases may be continuous with our assessment of instrumental opportunities offered by the same or by other artifacts. By avoiding the two-tiered system that Noë is advocating (activities versus practices), we are also avoiding the strict, hierarchical divisions that pit the functional, biological and necessary against the artistic, cultural and luxurious, which, as we have previously noted, is a division that frequently is enforced in ways that are often influenced by social and political issues. In our proposed model, a given artifact (whether it has a status as a tool or not is irrelevant) may, in addition to, or independent of its possible original purpose, offer an opportunity for immediate affection through its aesthetic qualities and in addition offer an opportunity for further reflection. A familiar lullaby, despite its functional role as an organizational activity, can draw our attention to the harmony it provides us and the emotional memories it encourages us to remember, and at the same time motivate thoughts about the practices and the world that make this lullaby possible. There is no strict division between these two aspects of experience.

Contrary to a strict hierarchical approach to art appreciation, we can allow for the possibility that the immediate affective experience may be changed by, for instance, increased background knowledge about this particular piece of art's place in a larger artistic tradition, or its place within a particular sociopolitical landscape. This possibility does not mean that there is indiscriminate top-down causation when it comes to aesthetic experience. Instead, sensory-motor and affective experiences are already permeated by cultural influences that establish the world of meaningful practices within which the piece of art and the beholder are understood. In addition to allow-

ing for a variation of aesthetic experiences across a spectrum that correlates with different artistic genres and practices, this world of meaning then allows for how people with different degrees of familiarity with a particular tradition or practice can have varying perceptions and understandings of what makes a particular piece meaningful. This flexibility regarding informed opinion also permits greater exploration of the nuances in cross-cultural art appreciation. Some immediate affective experience may come about regardless of background understanding due to the generalizability of certain stimuli across many cultures; some others may require greater familiarity with the situatedness of the given work of art.

5 A Case Study

To specify the contributions of this positive account to an understanding of aesthetic experience, it would be best to use a specific example that allows us to highlight both the immediate experience we can have with a given work of art, and the reflective experience that allows for the reevaluation of the implicated practices. This example could also help highlight the differing dimensions of experience that would be accessible to individuals based on their ability to assess the work of art as existing in dialogue with artistic tradition and a world of non-artistic meaningful practices. To this end, we will look at one piece of art that helps us analyse a concrete instance of how multiple types of affordance are unified in experience. Sandy Rodriguez's "You Will not Be Forgotten, *Mapa* for the Children Killed in Custody of US Customs and Border Protection" (hereafter, *Mapa*) is one such instance. *Mapa*, which isn't literally a map, uses traditional paper crafting techniques to represent the Southwestern United States and Mexico, highlighting the states in question with vivid colours. It is marked with animals and plants native to the region, and the waterways of the region as well. Various unnatural symbols such as a white van and a helicopter also convey the immigration enforcement presence that is present in the region alongside the natural world. The plants together form an indigenous recipe for trauma (*susto*). Several figures painted in the style of the codices that have survived colonization are huddled together crying just south of Texas. Several white circles represent the locations at which migrant children died in the custody of Customs and Border Patrol. The recipe for trauma conveyed in the piece is a response to the pain and trauma that has been exemplified by child detention policies along the border, and serves to humanize the currently incarcerated children (Rodriguez 2020). For reference, we are reproducing one part of *Mapa* which communicates a number of natural and unnatural place markers that establish a naturalistic and political

Figure 1 Sandy Rodriguez. *You Will Not Be Forgotten. Mapa for the Children Killed in Custody of US Customs and Border Protection*. 2019. Hand-processed watercolour and 23k gold on amate paper. 94.5 × 47 inches. Image courtesy of the artist. Photo b

sense of place via a system of cultural references that are entrenched in a regional history **[fig. 1]**.

Here we see several concrete features such as waterways represented alongside human figures, plants and animal, man-made objects such as helicopters and finally, more abstract features such as the night sky to the northeast. How can we understand this aesthetic experience via an extended, embedded, ecological and enactive perspective? The typical pragmatic orientation that is often prioritized in extended accounts will not quite work here, as this is clearly not a map that we would use to literally navigate us to a given location. However, Noë's model, which insists on viewing the non-pragmatic affordance as an instance of the strange pragmatic affordance is likewise unlikely to fully account for how this piece operates. Establishing that the piece works aesthetically in how it resists its role as a map, or serves as a strange map, misses the dimensions of the piece that depend precisely on how it offers other kinds of affordances, even as it re-routes our affective response (affording, for example, some type of empathetic response to the weeping figures), or motivates other possibilities (inspiring, for example, a longer-term reflection on the social and political context).

In contrast, we can use the double attunement model to underscore the ways in which the various affordances are in fact unified in experience. That is, finding that the piece affords some type of empathetic response to the weeping figures, or that the piece affords

the inspiration for a longer-term reflection on the social and political context that the piece explores, is continuous with the everyday activities that the artwork plays upon in order to communicate these points. To presuppose that there is something more basic about the underlying pragmatic components of the experience, and something more distinctly cultural about the reflective components of the experience (as Noë does), is to ignore the ways in which different affordances are integrated in one experience. This piece is especially exemplary, assisting us in the reevaluation of this distinction, in how it is an organizational activity (that maps some events and a medicinal recipe)[7] alongside a re-organizational practice (a reflective remembrance of children who have died in Customs and Border Patrol custody). What *Mapa* is offering us is precisely a depiction that is situated in a world of meaning such that its aesthetic qualities can be immediately affective, and continuous with an understanding of what these qualities in turn represent.

Again, however, the spectrum of revelations made possible through reflection and inquiry about the piece are not entirely separable from the immediate affective experience brought about by the perception of the formal components that comprise the piece. These aspects of experience co-permeate each other. These modes of seeing-in to what is represented by the piece and in what ways this representation is happening are situated in a larger artistic and social context that informs the experiences of a beholder in a variety of ways.

The features of this particular artwork, different from all other paintings, different from all other art forms (e.g. music, dance, theatre, literature), draw our attention to them in varieties of action-oriented and affective experiences that are best captured in a doubly attuned, relational affordance structure that depends on that precise work and who is experiencing it. Our ability to apprehend, for example, the emotion of the figures in the piece, draws on our own experience of the world in which our bodily emotional responses to stimuli are part of how we experience meaning in the world, and at the same time is constrained by how the work of art and its artist are centred in a broader network of significant artifacts and traditions.

Such experiences of significance happen through the situated, embodied, enactive experience of a particular beholder. A cognitivist account that attempts to overintellectualize this process at the expense of the significant embodied affectivity of this process misses

7 Included in the work is "a visual recipe for healing '*susto*' or trauma, as written in the colonial medicinal manuscript Codex de la Cruz-Badiano… The map provides the ingredients for a potion and poultice that includes orchid, two types of plumeria, swallow's nest, river water, sea foam, and other elements" (Rodriguez 2020). The plants represented in *Mapa* reflect a medicinal recipe, and so communicate an organizational activity. It is not necessary to subvert this activity for the aesthetic experience to emerge.

the central starting point of this investigation. But what is it about this appraisal that is especially significant to 4E cognition? A typical extended model is challenged when it tries to explain the world in terms of tools that constitute cognition since art appears to be a clear example of an artifact that resists categorization in this way. On an explanatory extended view, an account of cognition must involve an adequate explanation of how interaction with artifacts in the world partially constitute cognition without these artifacts themselves becoming simplistic extensions of the mind. Body, brain and environment form one system in which aesthetic experience can be simultaneously and variously characterized as sensory-motor, affective, cultural and cognitive.

6 Conclusion

We've argued that the active externalism of the extended mind approach on its own can end up focusing on examples that emphasize functional integration with tools or instruments, and thereby oversimplify the links between mind and world that 4E researchers attempt to explore. We have suggested that conceiving of art and aesthetic experience in terms of tools or technologies is a good example of this type of oversimplification. In order to reject this oversimplification, we propose a double attunement in aesthetic experiences in which multiple dimensions of what a piece offers are present within the same experience in ways that co-permeate one another and inform a unified aesthetic experience. After reviewing some of these accounts in the context of 4E approaches more generally, we proposed an enactivist account that does not claim to explain art and aesthetic experience in all cases and everywhere. This enactivist account based in double attunement emphasizes the continuity of possibilities in aesthetic experience such that we appreciate the co-permeation of these possible experiences, as opposed to strict top-down or bottom-up explanations. We think that it may take 4 or more E's to address the broad spectrum of aesthetic experiences that correlate to the broad variety of artistic genres.

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Enactivism and Normativity
The Case of Aesthetic Gestures

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Abstract Enactivist approaches claim that cognition arises through a dynamic interaction between an acting organism and its environment. An ongoing challenge for these approaches is the problem of accounting for normativity while avoiding overly reductionist outcomes. This article examines a few proposed solutions, including agent-environment dynamics, participatory sense-making, radical enactivism, the skilful intentionality framework, and enactivist cultural psychology. It argues that good examples of enacted normativity are gestures of appreciation/disapproval performed in the aesthetic domain. Both Wittgenstein and Dewey explore this issue and their ideas could be productively worked upon in an enactive account.

Keywords Enactivism. Normativity. Wittgenstein. Pragmatism. Gestures.

Summary 1 Introduction. – 2 Agent-Environment Dynamics, Sense-Making, and Radical Enactivism. – 3 Situated Normativity, Skilful Intentionality, and Enactive Cultural Psychology. – 4 Aesthetic Gestures. – 5 Pragmatist Cultural Enactivism. – 6 Conclusion.

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1 Introduction

Embodied, enactive, embedded, and extended approaches to cognition (4E Cognition approaches) aim to account for the mind in a naturalistic framework, privileging an anti-dualist and often anti-representationalist perspective that takes the mind to be an aspect or a part of an organism – a body – and the organism to be crucially entrenched in an environment. In this kind of framework, the interactions between the organism and the environment, and the interactions between different organisms, play a fundamental role in the development of cognition. To perceive is not merely to receive bits of information, and to know is not simply the result of performing some mental computation on the basis of that information, assembling mental representations of the external world. Rather, perceiving and knowing are activities enacted by living organisms in their environments in a continuous flux of movement, reciprocal adaptation and change. While different authors are variously committed to defending one or more of the four E's, certain basic tenets are generally shared by these approaches, most notably an anti-Cartesian attitude that resists the traditional picture of the mind as separated from (and superior to) the body.

In this paper, I will focus in particular on *enactive* approaches, by which I mean a variety of perspectives originating from Varela, Thompson and Rosch's seminal *The Embodied Mind* (1991), but also taking inspiration from and developing the notion of affordances as proposed by the ecological psychology of James J. Gibson (1979).[1] In recent years, enactivists have attempted to extend their scope: while they originally focused on basic cognitive activities and interactions, now they offer wide-ranging accounts of more articulated, complex, and 'high-level' cognition,[2] involving not only natural coping and elementary social skills but also abstract reasoning, language, responsiveness to norms and values, complex social practices, and, ultimately, culture itself. This extension can assume various shapes, both in diachronic and in synchronic terms. Diachronically, an enactivist approach can help understand the evolution of cognition from basic animal forms of life to the later stages of humankind (phylogenesis); or the development of high-level cognition in the human child (ontogenesis). Synchronically, an enactivist analysis of basic and high-level cognition can show how the two are interrelated, and this again can be done from different points of view and with dif-

1 For the sake of brevity, I assume the reader's familiarity with the basics of these approaches.

2 Although I believe it is not the most felicitous, I am using the expression 'high-level' because it is widely employed in the literature.

ferent methods. There is also a methodological issue involved here. While a *scientific* approach might look for causal explanation, a *philosophical* one might aim towards conceptual clarifications (cf. Glock 2018). This paper is a *philosophical* analysis of some conceptual difficulties and impasse that enactivist approaches face in their attempt to enlarge the scope of their accounts to high-level cognition. More specifically, I will direct the attention to enactivist accounts of *normativity*, by which I mean all those phenomena of human life that involve norms and/or values, and therefore the distinction between right and wrong, correct and incorrect, especially from the point of view of ethics and aesthetics. This is admittedly a broad notion, whose meaning will become clearer as the argument proceeds. The challenge that enactivism faces in tackling normativity, as I see it, is the challenge of explaining it without explaining it *away*. Is it possible to offer a naturalistic but non-reductionist account of these phenomena, one that allows for understanding them better without reducing them to something non-normative?

In tackling this question, I will proceed as follows. In section 2, I will present some enactivist attempts of making sense of normativity – namely, agent-environment dynamics, participatory sense-making, and radical enactivism – and some criticisms that have been levelled against them. In section 3, I will move to other proposals within the enactivist family – situated normativity, skilful intentionality, and enactive cultural psychology – that are not subject to the same criticism. One of these proposals finds inspiration in some Wittgensteinian remarks on 'aesthetic reactions' and on gestures; in section 4, I will linger on these aspects, focusing on what I will call 'aesthetic gestures' as a good example of enactive normativity. This will allow for a deeper examination of the notion of normativity. In section 5, I will claim that the pragmatist tradition has good resources for developing this insight, focusing on G.H. Mead's analysis of gestures and on John Dewey's concept of 'qualitative thought'. I will conclude that a non-reductionist enactive account of normativity *is* possible under certain conditions and that aesthetic gestures are a promising object of investigation for it.

2 Agent-Environment Dynamics, Sense-Making, and Radical Enactivism

Anthony Chemero proposed a "radical embodied cognitive science" (2009) that completely does away with representation and computation; by appealing to the pragmatist/naturalist tradition of William James and John Dewey, as well as to Gibson's ecological psychology, it describes cognition in terms of agent-environment dynamics. There is a passage in Chemero's book that is particularly interesting

for our purposes. In order to understand it we need to take a step back and first have a look at the perspective that Chemero is arguing against: Mark Rowlands' theory of "representation in action" (2006). With the aim of explaining representation through action (which he sees as a variant of Wittgenstein's problem of explaining rule following through practices), Rowlands describes actions in terms of normative claims on 'tryings': an action of the type *f-ing* is such if an intentional state of the kind 'trying to *f*' precedes it. "The identity of an action", he claims, "depends on what *should* cause it, not on what merely *does* cause it" (2006, 61), and therefore a merely causal theory of action fails to accommodate its normative dimension. In order to account for this normative dimension, Rowlands proposes his Thesis of Representation in Action: some actions, that he calls *deeds*, are themselves representational and normative and there is no need to appeal to other representational or normative elements to explain them.

According to Chemero, instead, it is possible to account for the normativity in human perception and action, solving Rowlands' alleged problem, without appealing to this representational aspect. This is because *affordances* are themselves normative; indeed, they are only comprehensible "in terms of norm-laden abilities" (2006, 146 fn. 9).[3] In other words, an individual with an ability is supposed to behave in a particular way and may *fail* to do so. Differently from dispositions, that according to Chemero inevitably become manifest whenever coupled with the right enabling conditions,[4] abilities are normative. In explaining this point, Chemero affirms:

> A better way to understand abilities is as *functions*. Functions depend on an individual animal's developmental history or the evolutionary history of the species, both of which occur in the context of the environment. […] Abilities come to play the role they do in the behavioural economy of the animal because, at some point in the past, they helped the animal (or its ancestor) to survive, reproduce, or flourish in its environment. Yet even in identical circumstances to those in which they were helpful in the past, abilities can fail to become manifest; there can, that is, be a *malfunction*. (2009, 145)

I am not sure that talk of abilities as functions, and of affordances as normative relations in virtue of that, is very helpful in solving the is-

3 Chemero is also reinterpreting Gibson's notion of affordances here. Originally defined as *properties of the object* that show possibilities of actions for a user, in Chemero's view they are *relationships* between the perceiver and the object (or the environment more generally).

4 For a different, Wittgenstein-inspired account of dispositions, see Morelli 2020.

sue of normativity (I am not concerned here with the issue of representation). There is indeed a big difference between the binary success/failure, which seems appropriate for the notion of functions, and the binary correct/incorrect, which pertains to normativity (Heras-Escribano 2019, 92-3). A further problem with the concept of a function is that understanding something, such as an ability, as a function, depends on knowing what it is a function for. Indeed, a machine, typically, functions (or not), it works (or not), but it is not the machine itself, be it taken in isolation or together with its environment, that functions or not; it is us, an interpreter, that can see it as functioning or not (Boncompagni 2018a, 80; cf. Heras-Escribano 2019, 94-5). Similarly, affordances *per se* lack the criteria of correctness that would allow characterizing them as normative. It is the interpreter that enables such a characterization, by noticing what is the 'functioning' or correct way of interacting with them. It might be objected that the difference between an organism and a machine is precisely that the organism has its own survival as a sort of intrinsic goal. This is indeed a central idea in the autopoietic-enactive approach. Yet, talking of 'goals' and 'norms' here amounts to applying a misleading picture. This vocabulary belongs to another context, and it risks suggesting a host of other implications that are only appropriate of that other context.

Another way of putting the same point is by highlighting that Chemero's approach does not respond to Wittgenstein's argument against private language (Heras-Escribano, de Pinedo 2016; Heras-Escribano 2019, 93, 101-2). An action, in order to be characterized as normative, must not only satisfy a goal but also be performed under certain correctness criteria regarding the *right* way to satisfy such goal. Correctness criteria are crucially public or shared: an agent cannot distinguish between 'it is right' and 'it seems right to me' without appealing to public criteria (Wittgenstein 2009, 185-242).

This same criticism has been levelled against enactive approaches that focus on sense-making. Building on the original autopoietic-enactive theory proposed by Varela, Thompson and Rosch (1991), Di Paolo (2005) adds one element to the picture: *adaptivity*, defined as a system's capacity to regulate its states and its relation to the environment so as to respond appropriately to external perturbations, avoid risky situations, and seek preferable ones. Adaptivity goes beyond the basic 'norm' of keeping a unity going (autopoiesis), because it also accounts for an organism's preferring and seeking certain situations rather than others:

> Bacteria possessing this capability will be able to generate a normativity *within* their current set of viability conditions and *for themselves*. They will be capable of appreciating not just sugar as nutritive, but the direction where the concentration grows as

> useful, and swimming in that direction as the right thing to do in some circumstances. (Di Paolo 2005, 437)

In other words, the organism is able to *evaluate* its present situation with respect to an external element that has a positive or negative valence for it ('self-monitoring'), and to act appropriately, in the way it *should* act ('appropriate regulation'). Adaptivity, according to Di Paolo, implies a form of *normativity* in the organisms that possess it, and that is why it can account for disfunctions and pathologies (2005, 440), as well as for sense-making. The organism enactively *makes sense* of elements of its surroundings in that it uncovers and at the same time constructs the *meaning* they have for it.

Expanding on this view, De Jaegher and Di Paolo (2007) propose a theory of participatory sense making as an enactive approach to social cognition. When two (or more) individuals coordinate their movements and utterances, a "regulated coupling" emerges, a new organization, that is aimed at aspects of the coupling itself, without thereby destroying the individuals (2007, 493). In this context, sense-making gets social: new domains of sense become available, that were not there for individuals alone. A further step in this line of research is the enactive investigation of language in Di Paolo, Cuffari, De Jaegher (2018), in which it becomes clearer that there are different levels of normativity involved in the enactive approach, especially when it extends to the social and cultural domains. The first two levels were already described in Di Paolo (2005): the basic biological normativity of the organism as an autonomous unity, and the normativity involved in adaptivity and sense-making. A third level is the normativity of social interactions, where the coupling between individuals has its own rules. Finally, there is the normativity of the *habitus*, that reflects sociocultural practices and language. An important aspect that the authors underline is that what is 'given' in human action and experience is "the group and community life of historical transformation of the lifeworld, with its norms, rules, institutions and relations" (Di Paolo, Cuffari, De Jaegher 2018, 136), and that this composite 'given' includes language (or 'languaging', as they put it) as a *constitutive* ingredient.[5]

Now, what looks still a bit problematic in this approach is not the use of normative categories for social interactions, culture, the *habitus*, or linguistic practices; rather, one could raise doubts concerning the employment of words and concepts related to normativity and meaning at the level of elementary organisms' adaptivity and sense-making. As Heras-Escribano, Noble and de Pinedo have underlined, "when we say that an agent (for instance, a bacterium) is searching,

5 On language see also van den Herik 2020.

avoiding, intending or wanting we are not describing the agent, but interpreting, making sense of its behaviour" (2015, 26).[6] The 'making-sense' part is ours, the interpreters'. In other words, the risk in this approach is that it might suggest that 'high-level' normativity is *based on*, and therefore can be *explained* by reference to, 'low-level' normativity.

Hutto and Myin (2013, 2017), with their proposal of Radical Enactivist Cognition, use similar arguments to criticize what they call AAE (Autopoietic Adaptive Enactivism), that includes the above-mentioned perspectives based on sense-making. Radical enactivism defends a strong version of anti-representationalism and claims that the basic forms of experience and response to the environment are non-conceptual and contentless. In Hutto and Myin's view, the kind of intentionality that characterizes basic minds, including some forms of human cognition, is 'target-focused', but does not involve or require content; they call it 'ur-intentionality'. Ur-intentionality, or intentional directedness, has a basic normative dimension, in their view, but only in the sense that natural attunements between the organism and its environments that developed in the past structure the organism's current tendencies for response and "normatively fix what is intentionally targeted" (Hutto, Myin 2017, 116-17). Perspectives focused on sense-making are wrong, according to radical enactivists, in talking of meaning at the level of the organisms' adaptivity to the environment. It is only at a later stage and, as it happens, only in the human lineage, that special forms of sociocultural practices emerge. Only minds who have mastered these sociocultural practices can engage in content-involving cognition, and between these two stages – contentless and content-involving minds – there is a *difference in kind*, not just degree (Hutto, Myin 2017, 134).

While avoiding the vocabulary of meaning for basic minds, however, Hutto and Myin face another problem: they tend to posit a big divide between low-level and high-level cognition (Dreon 2019a). Although their recent book (2017) is explicitly aimed at somewhat bridging this gap, the insistence on basic cognition (including human basic cognition) being not only non-representational but also contentless risks overlooking how deeply even basic activities like perception itself and spontaneous reactions, *in the human context*, are imbued with culture and normativity.

6 Colombetti (2014) too seems to be committed to this vocabulary. For a response to Heras-Escribano, Noble and de Pinedo, see Di Paolo, Cuffari, De Jaegher (2018, 34).

3 Situated Normativity, Skilful Intentionality, and Enactive Cultural Psychology

Other approaches within the enactivist/ecological family take a different road. We might say that instead of naturalizing the normative, they tend to culturalize the natural – yet, crucially, not in the sense that they (mis)apply normative concepts to basic forms of life; rather, they detect normativity in the natural, instinctive and unreflective actions and reactions that are typical of the human (or in any case of complex) form(s) of life. Instead of claiming that the normative is natural, they claim that the natural is, for humans, normative.

Erik Rietveld starts from the realization of how "amazing" it is that "even without explicit deliberation we normally act in ways that are appropriate from the point of view of sociocultural practice" (2008, 973). There are numberless episodes in which individuals act without reflection, and among those episodes are not only automatic movements triggered by physical stimuli, but also expressions and reactions that are significantly linked to skills and expertise. Rietveld makes use of the Wittgensteinian notion of "directed discontent" (Klaassen, Rietveld, Topal 2010): the fast, instinctive and at the same time evaluative reaction of appreciation or disapproval that characterizes the relationship between an artisan and its work (typically an object), manifested in one's bodily postures, gestures, and facial expressions. The object in this context represents an affordance, or better a social or a cultural affordance.[7] Directed discontent is an example of situated normativity: it depends on a complex sociocultural background going all the way down to bodily movements. It is at the same time immediate and normative, lived (bodily) and cultural (communal). Its normativity is grounded in the human form of life, in a multifarious and relatively stable set of ways of living, sociocultural practices, shared background assumptions, values, habits and customs that show common patterns as well as geographical and historical variations. Directed discontent and aesthetic reactions in general are only understandable against the background of these regular ways of doing.

Elaborating on this and drawing from ecological psychology and ethnography, Rietveld, Denys and Van Wester have developed the Skilled Intentionality Framework, where skilled intentionality is defined as "the selective engagement with multiple affordances simultaneously in a concrete situation" (Rietveld, Denys, Van Wester 2018, 41), and an affordance is defined as "a relation between (a) an aspect of the (sociomaterial) environment and (b) an ability available in a

7 See Costall 1995, 2012; Solymosi 2013; Rietveld, Kiverstein 2014; Ramstead, Veissière, Kirmayer 2016; Carvalho 2020.

'form of life'" (45). This perspective takes fully into account the fact that human beings respond to both material affordances and social opportunities for engagement, and the two are inextricably interconnected. Whether a bottle of water solicits me to grab it and drink the water or not does not depend only on material and biological aspects, including my thirst, but also on human social norms, such as ownership for instance (Costall 1995, 473). In this view, the material and social sides of affordances are constitutively entangled (there cannot be the material without the social, or the social without the material). The human eco-niche is "sociomaterial" through and through (van Dijk, Rietveld 2017, 2): human beings show a selective openness to affordances that is "appropriate with respect to a socio-cultural practice or *form of life*" (Bruineberg, Chemero, Rietveld 2019, 5234).

A similar outlook is adopted in enactivist cultural psychology:

> A radically cultural enactivism requires more than an account of human experience that builds up from biological autonomy to society and culture. It requires us to acknowledge the irreducible normativity of everyday life and of even our most personal actions and expressions. For humans, to perceive and to act is to perceive and to act in a way that always remains sensitive to normative (hence social) correction. (Baerveldt, Verheggen 2012, 168)

Cultural enactivism avoids both deriving normativity from a biological intentionality or natural teleology and describing it in terms of the internalization of cultural models or representations. Our socialization in a cultural environment instead is thought of as involving "a historical process of continuous attunement to consensually orchestrated community practices" (Baerveldt, Verheggen 2012, 179), where training and learning techniques (as opposed to rules) assume a fundamental role. Baerveldt and Verheggen also build on Wittgenstein's notion of a form of life, describing it as "a total style of being" (2012, 183); they also talk of cultural competence as "a stylization of a total way of life" (184) and of normative dispositions as "expressive skills and styles" (185). The notion of style that is adumbrated here helps illuminate how culture has local and personal interpretations – that is, different ways of being enacted – where the very possibility of embodying and expressing a style relies on having acquired a competence or a mastery through training and corrections (cf. Milkov 2020, 511).

In sum, situated normativity, the skilled intentionality framework, and enactive cultural psychology all point towards an idea of normativity in the human form of life as embodied, enacted, and yet irreducible. Human life is normative from the start and all the way down: normativity shapes the everyday. Perception itself from this point of view is sensitive to the normative, as demonstrated by "socially de-

pendent perceptions" (Arango 2019). These are differences in perception shown by members of different social groups. For instance, patterns of eye movement differ in people from America and from China when confronted with a scene in which a background and a focal object can be distinguished. The point is that we *learn* to perceive, and socially dependent perceptions show "the enactment of culturally structured, normatively rich techniques of interaction with multi- and inter-modal perceptible materials" (Arango 2019, 39). There are cultural styles of seeing that frame what is to be considered salient in a scene, as well as what is and what is not an agreeable and harmonious relation between different colours, surfaces, or patterns. What we encounter here is the connection between perception and *aesthetics*. On this terrain, the intrinsically normative and evaluative aspect of the human form of life comes to the fore.

4 Aesthetic Gestures

Wittgenstein's notion of forms of life plays a relevant role in the perspectives just examined. I would like now to expand a bit on this legacy by focusing on Wittgenstein's remarks on gestures, and on 'aesthetic gestures' in particular.

The importance of gestures in Wittgenstein's philosophy can hardly be overestimated. An often-told story even suggests that a specific gesture had a fundamental part in the shift from his early to his later thought. According to the anecdote, Wittgenstein was travelling with the Italian economist Piero Sraffa, and presumably explaining his views, when the latter made a Neapolitan gesture "brushing the underneath of his chin with an outward sweep of the finger-tips of one hand" (Malcolm 2001, 58; Engelmann 2013, 152) – a sign meaning something like 'I don't care' – and asked Wittgenstein what was the grammar of that. Although Wittgenstein does not offer specific clues regarding the significance of this episode, remarks about gestures in general abound in his writings.

Wittgenstein's interest does not lie in gestures as the external expression of an internal idea or state of mind (though he does talk of gestures in the context of expression), or on representational gestures, i.e. bodily movements that tend to reproduce something (Alibali, Boncoddo, Hostetter 2014). One of the themes around which his remarks tend to cluster is pointing, a context in which gestures are often connected with language. In his view, however, although pointing gestures are used in language acquisition, considering gestures as 'prototypes' of language is misleading, because it oversimplifies both gestures and language (Wittgenstein 2005, 23-25; Wittgenstein 2009, §§ 1-3). One reason why is that even in this alleged elementary form, the meaning is *not* fixed by the gesture. In order to understand

a pointing gesture, we already need to know what we are supposed to focus on, which aspect of the object or scene the gesture points to. If I say 'XYZ' pointing towards a wooden black table, my interlocutor might interpret the word 'XYZ' accompanied by my gesture as referring to the table as an object, to the material (wood), or to the colour (black), or to other aspects (e.g. solidity, the shape of the table, my desire to have dinner etc.). This is another way of saying that a gesture is only a gesture if it is embedded in a normative context that clarifies how it is to be interpreted. In other words, it is true that "our language-game is an extension of primitive behavior", for "our *language-game* is behavior", or "instinct" (Wittgenstein 1981, §545),[8] but at the same time it is true that "a gesture doesn't have to be innate; it is instilled, and yet *assimilated*" (Wittgenstein 1982, §712). This is clear if we think of gestures belonging to cultures different than ours. "We [Europeans] don't understand Chinese gestures any better than Chinese sentences" (Wittgenstein 2005, 8; Wittgenstein 1981, §219), Wittgenstein observes, and we need to learn these gestures, either by being told what they mean in words, or just by growing up or being trained in that culture. Gesture is natural and cultural at the very same time.

To clarify, this is not to deny that pointing might have a special role in language acquisition or in the development of joint attention, or that it is so natural that even some non-human animals can understand it (Kita 2003). Rather, these considerations help broaden the perspective from the pointing gesture to gestures more generally and help see how much the naturality of gestures is already a cultural or normative naturality. Gestures in the aesthetic domain further illustrate the point.

Recall Rietveld's talk of aesthetic reactions: these are immediate and evaluative reactions of appraisal or disapproval, where the evaluative moment is not merely on a pleasure vs. disgust axis, but on the axis of aesthetic *value*.

> You design a door and look at it and say: "Higher, higher, higher... oh, all right." (Gesture) What is this? Is it an expression of content?
>
> Perhaps the most important thing in connection with aesthetics is what may be called aesthetic reactions, e.g. discontent, disgust, discomfort.... The expression of discontent says: 'Make it higher... too low!... do something to this.' (Wittgenstein 1966, 13; see also 3)

Aesthetic taste is inevitably culturally shaped, and yet it often finds its most *appropriate* form of expression not in a propositional judg-

8 This aspect is perfectly in line with a 'bottom-up' enactivist account; see Moyal-Sharrock 2013.

ment – as one could think, given the alleged 'high level' cognition involved – but in *a normative gesture*. Sometimes in the domain of aesthetics we are really unable to explain in words what we can express in gestures, facial expressions, and fine shades of behaviour (Wittgenstein 1966, § 12).[9]

The understanding of works of art, for instance of a musical piece or a musical phrase, is also typically (though not exclusively) expressed in appropriate gestures and behaviour (Wittgenstein 1998, 79).[10] The reaction to a piece of music is immediate *and* it involves culture-specific competence. As Schulte (1993, 53) puts it, making the point more general:

> Even our so-called "spontaneous" forms of reactions – certain kinds of gestures or dance steps when listening to music, exclamations like "Ouch" or "Help!" or more complicated forms of behavior in the case of pain – will acquire sense only within a language game and hence through their connections with certain kinds of conduct and through being embedded in relevant practices. […] A new experience is not even an experience if the relevant concepts are lacking, that is, if one has not learnt to make a number of moves in the language game in question. And if we do not know the techniques to be used in the language, there will be no spontaneous reactions to our experiences.

Spontaneity is cultural, and this is what a truly enactivist account of normativity should be able to describe. Aesthetic gestures are an example of this spontaneous normativity: they are embodied, enactive, and they show that normativity is in everyday life (Frega 2015), rather than being a set of rules that somewhat stay above our heads and that we sometimes consult, pick up and apply.

5 Pragmatist Cultural Enactivism

The notion of enacted normativity that emerges in investigating gestures is especially interesting for pragmatist-inspired enactivism (Menary 2016; Madzia, Jung 2016; Gallagher 2017; Madzia, Santarelli

9 This is also related to Wittgenstein's notion of 'imponderable evidence' (Wittgenstein 2009, part II, §§ 358-60); cf. Boncompagni 2018b.

10 For a comparison between language and music based on gesture see Oliva 2016. Wittgenstein also compares works of art themselves to gestures (on this see Milkov 2020): "Architecture is a gesture – he claims for instance –. Not every purposive movement of the human body is a gesture. Just as little as every functional building is architecture" (Wittgenstein 1998, 49): there is something in a gesture that exceeds purposive movement, it exceeds movement as a function of the organism.

2017; Weichold 2017). As Gallagher, referring to Robert Brandom, has suggested: gestures have "socially instituted significance and normative status" (2017, 172), in that they are part of how we grasp other people's intentionality (without the need of postulating internal states of mind) and of how we track other people's behaviour (without the need of explicit rules for that). Gestures indeed transcend their merely motor aspects and are both natural and conventional, precisely like language (Gallagher 2005, 122, 126).

Like Wittgenstein, the pragmatists point at the intertwinement of bodily/natural and sociocultural/normative aspects in the human form of life (but see Boncompagni forthcoming for differences). This is clear in the pragmatist notion of habit. From a pragmatist perspective, habit is essentially the result of 'paths' or 'channels' formed in the brain, but at the same time it is socially and culturally shaped, as the individual is a social and cultural being from the start. Gesture, in this sense, is revelatory of habits of acting and thinking.

Not coincidentally, one of the most relevant accounts of gestures in philosophy is due to the pragmatist thinker George Herbert Mead, who identified in gesture "the basic mechanism" of the social process:

> Within any given social act, an adjustment is effected, by means of gestures, of the actions of one organism involved to the actions of another; the gestures are movements of the first organism which act as specific stimuli calling for the (socially) appropriate responses of the second organism. […] The specialization of the human animal within this field of the gesture has been responsible, ultimately, for the origin and growth of present human society and knowledge, with all the control over nature and on the human environment which science makes possible. (Mead [1963] 2015, 13-14, fn. 9)

Against the idea of gesture as the expression of an already formed internal mental state, Mead claimed that consciousness itself emerges from the mechanism of gestures, once a participant hears his/her own vocal gesture in an interaction and learns to react to it. Therefore, the social act (the conversation of gestures) is a precondition of consciousness rather than the other way around (Mead [1963] 2015, 17-18). While this idea of the development of consciousness sounds in line with the participatory sense-making approach, in earlier writings Mead also highlighted bodily attitudes, facial expressions and the tone of voice as affectively felt in the social exchange (Mead 1895, [1895] 2001). By taking into account the human embeddedness in a sociocultural environment, it is possible to envision here a perspective in which linguistic and broadly cultural and normative practices

reshape bodily and emotional gestures themselves.[11] In other words, affective sensibility as a means of reciprocal regulation is reshaped by virtue of its belonging to a cultural and linguistic context from the start (Dreon 2019b).

This understanding of gestures and emotive responses as already normatively shaped is also coherent with Dewey's cultural naturalism. Of the many aspects of Dewey's approach, I would like to highlight here one that strikes me as a pragmatist equivalent of the Wittgensteinian reflection on aesthetic reactions and aesthetic gestures, namely, his remarks on linguistic ejaculations and interjections. In his article "Qualitative Thought", published in 1930, Dewey claimed that some expressions such as 'Alas', 'Yes', 'No', or 'Oh!' are not merely organic responses of the human being, but symbolize "an integrated attitude towards the quality of a situation as a whole" and "have an intellectual import" ([1930] 1984, 250). Moreover, he claimed, like Wittgenstein, that sometimes an aesthetic judgment concerning, for instance, the quality of a piece of acting on the stage, or a deed performed, or the "a picture with its wealth of content", finds a better expression in these symbols, or in an exclamation like "Good!" (something that Wittgenstein would say is just like a gesture), rather than "in a long-winded disquisition" ([1930] 1984, 250). These expressions, for Dewey, are examples of *qualitative thought*, a wording that already manifests the interlacing of immediacy and normativity.

> While they are primitive, it does not follow that [such ejaculatory judgments] are always superficial and immature. Sometimes, indeed, they express an infantile mode of intellectual response. But they may also sum up and integrate prolonged previous experience and training, and bring to a unified head the results of severe and consecutive reflection. ([1930] 1984, 250)

Attention to the qualitative is a constant element in Dewey's thought (see for instance Dewey 1925). The passages just quoted show that for Dewey, in the human context, immediacy is permeated and structured by evaluative and normative strands. In this sense, it is precisely the *richness* of human beings' interactions with their environment that Dewey invites us to look at, *contra* reductionist accounts. This also means acknowledging the impact of culture and language on alleged basic aspects of cognition such as perception, motor action, and affective sensibility, seeing the human ecological niche as highly social, culturally stratified, and linguistic. This suggests, again, that the separation between 'low' and 'high' cognition is itself problematic and misleading (Dreon 2019a).

11 On the normativity of emotions see Hufendiek 2017.

6 Conclusion

The issue of normativity proves tricky for enactivist approaches. Accounting for it in a naturalistic framework and at the same time avoiding forms of reductionism is no easy task. Some versions of enactivism that project normativity upon a merely autopoietic and adaptive behaviour risk missing the point when they tend to misapply concepts that are appropriate to the human domain onto basic forms of life, and/or suggest that normativity can be explained by reference to these basic behaviours. Other enactivist approaches focused on the human sociocultural environment seem more promising. An enactivist account of normativity in the human context is indeed particularly apt to capture the embodied and spontaneous nature of normative constraints in everyday activities and interactions, unveiling how separating 'high' and 'low' or basic cognition is actually a misleading move. Aesthetic gestures show this very clearly. These natural, spontaneous and at the same time deeply cultural and evaluative reactions are examples of enacted normativity.[12] Aesthetic gestures were examined here in the framework of Wittgenstein's philosophy, but it was also argued that pragmatism developed a similar understanding, most notably with John Dewey's concept of 'qualitative thought'. To conclude: an enactivist inquiry into aesthetic gestures, supported by Wittgensteinian and pragmatist insights, could help characterize human cognition as intrinsically enactive *and* normative, exemplifying an authentically non-reductionist perspective.[13]

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12 Notice that they also respect the five features of normativity highlighted by Heras-Escribano (2019), within the ecological approach: correctness criteria, agency, intelligence, context-sentivity, and social constitution.

13 An early version of this paper was presented at the international conference "The Pragmatist Turn and Embodied Cognition", University of Parma, 2017. I thank the organizers and the audience for very helpful comments and discussions.

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Raw Cognition
Rhythms as Dynamic Constraints

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Abstract There is increasing evidence that the rhythmic interactions between intrinsic oscillators both in the body and in the brain play a constitutive role in cognition. However, the mechanisms and extent of these interactions are yet to be fully understood. In this article, I will contend that a notion of rhythm as an open entrainment can be useful for enactive approaches to different aspects of cognition. It allows us to think of the different oscillators that we find in the body, the brain, and the environment as nested dynamic constraints that through neuronal and non-neuronal interactions tie together the different domains while retaining their specific functions.

Keywords Rhythm. Constraint. Entrainment. Dewey. Enactivism.

Summary 1 Introduction. – 2 Chasing Rhythms. – 3 The Oscillations behind Rhythm. – 3.1 Bodily Rhythms and Cognition. – 3.2 Brain Rhythms and Cognition. – 3.3 Environmental Rhythms and Cognition. – 4 Cognitive Rhythm and Nested Dynamic Constraints.

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1 Introduction

From an enactive point of view, cognition starts with an interaction. It does not matter whether we refer to the attunement between the actions of different subjects, to the engagement between an agent and its environment, or to the regulation between different aspects constitutive of cognition. Wherever we lay our eyes, we see oscillatory components interacting. However, the moment we isolate one of these temporal patterns and try to replicate the circumstances that have originated it, everything becomes more complicated. It is as if the particular pattern affects and is affected by the whole set. The enactivist position could be summed up as follows: the brain, body, and environment are dynamically combined into a system through physical relational processes in which significant changes in one part of the system cause changes in the other parts (Gallagher 2017, 8). Although enactivism is at the spearhead of this emphasis on dynamic aspects of cognition, cognitive science research in general points to a steady transition from a focus on stability to a focus on time-evolving interactions. In this paper, I will argue that a concept of rhythm based on entrainment rather than on order or repetition can be useful for enactive approaches to cognition, for it allows us to think of the different oscillators that we find in the body, brain, and environment as parts of nested dynamic constraints that nonlinearly modulate cognition.[1] I will start by viewing this notion in relation to a Deweyan understanding of rhythm. I will then identify some neuronal and non-neuronal oscillatory activity originating in the body, the brain, and the environment, and their interactions through entrainment. In the final section, I will lay the foundation for an enactive view of cognition based on rhythms as nested dynamic constraints.

2 Chasing Rhythms

The earliest preserved account of the word ῥυθμός (*rhuthmós*) is found in a poem by Archilocus in which, according to Barletta, it denotes

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1 The idea that the complexity of cognition can only be understood through nonlinear dynamics – i.e. the branch of physics that studies systems governed by equations more complex than the linear aX+b form – has been widely accepted since the seminal works by Freeman (2000) and Van Gelder and Port (1995).

> a force that not only limits or constrains all humans [...] but one that also gives us form and meaning, pushing us always toward a mean between two forces. (2020, 3)

Yet, nowadays the most widespread understanding of rhythm is quite different. We tend to think of a rhythm as a regular temporal pattern of elements. We find iterations of this definition in dictionaries, papers, and the scientific literature. The origins of this conceptualization can be traced back to Plato's *Laws*, in which he defines rhythm as "order in movement" (Plato 2005, 665a). However, the debate on rhythm is far from settled.

In cognitive science rhythm is an important concept. Yet, there is no consensus on what rhythm is. In one paper aptly titled "What Do We Talk about When We Talk about Rhythm?", Obleser, Henry and Lakatos acknowledge that

> we are still lacking a good working definition of rhythm. What does rhythm mean to a human or non-human brain, and to a perceiver more generally, and how variable does a sequence of events need to be so that our brains will cease to register it as rhythmic? (2017)

Leaving aside the cognitivism which transpires from the assumption that only the brain is implied in rhythmic perception and that this is a passive event which we just perceive or register, they highlight the most pressing question concerning the Platonic definitions of rhythm: how much variability can a rhythm display without ceasing to be a rhythm? This issue has given rise to an abundance of terms such as quasi-rhythm, pseudo-rhythm, and quasi-regular rhythm, which contribute to the lack of conceptual clarity. The tentative answer to the question provided by Obleser, Henry, and Lakatos is:

> regularity manipulations themselves need to be of sufficient magnitude and quality to modulate both percepts of rhythmicity and entrainment of a (neural or other) oscillator. Even then our beloved tools for dissecting rhythmic and non-rhythmic processes in the neural domain can be turned into rusty blades by notorious interpretational problems. This should encourage us to humbly spell out our predictions in those domains where rhythm truly resides: in perception and behavior. (2017, 4)

That is, we have a rhythm as long as it simultaneously affects perceptual experience and its underlying entrainment. In my opinion, their definition is far too restrictive to be useful for enactive approaches to cognition: are higher cognitive processes devoid of rhythm? Is there no entrainment between brain oscillatory activity and bodily oscillatory activity? Nonetheless, I wish to draw attention to this no-

tion of entrainment. Lakatos, Gross and Thut define entrainment as "phase locking resulting from (predominantly) unidirectional coupling" (2019, 890). From their point of view, entrainment denotes the mechanisms by which periodic or almost periodic events from the environment – e.g. music, speech, movements, day-night cycles – drive the oscillatory activity in the perceiver's brain, leading to the alignment – phase-locking in neuroscientific jargon – of their frequencies. I regard this to be a strong version of entrainment. However, there are weaker versions of it too. Many studies consider entrainment to mean not just perfect phase-locking, but also the general tendency towards this state (Pikovsky, Rosenblum, Kurths 2001). And they view it not as an exclusively unidirectional process, but as one involving two or more self-sustained oscillators (Rimmele et al. 2018). I believe that assuming these two conditions implies a weaker but more open version of entrainment, which is the one that I will support in this paper.[2] From my point of view, when Trost and Vuilleumier (2013) speak of perceptual, autonomic, physiological, motor, and social types of entrainment, they also back a weaker understanding of entrainment. And although the regulation between these different levels of entrainment is still open to discussion, Trost, Labbé, and Grandjean (2017, 105) suggest that these different types of entrainment are part of the same phenomenon.

Coming back to philosophy, I think that John Dewey is among the few thinkers to have developed a thorough notion of rhythm. Dewey maintains that nature is ripe with different types of temporal patterns, and that rhythm is the kind of pattern which has the capacity to build up energy, as in the case of

> a pond moving in ripples, forked lightning, the waving of branches in the wind, the beating of a bird's wing, the whorl of sepals and petals, changing shadows of clouds on a meadow. (Dewey 1980, 161)

2 Despite this weaker understanding, entrainment still differs from other close concepts such as resonance. Rimmele et al. define resonance as "a passive phenomenon where neuronal responses reflect the stimulation frequency. This is generally distinguished from oscillatory phenomena, where neurons oscillate at a preferred frequency in the absence of stimulation and can entrain to an external stimulation" (2018, 872). Another important difference is that episodes of resonance only last while there is an oscillatory interaction and that they only take place as long as the frequencies of the oscillating elements are the same or nearly the same. On the contrary, once there has been an influence in the phase between two entrained oscillations, if we separate them, entrainment will not immediately disappear, but will last for some time after the interaction (Pikovsky, Rosenblum, Kurths 2001). Yet, there is room for interaction between the notion of entrainment I adopt and other characterizations of resonance: specifically, non-representational radically embodied definitions, such as the one offered by Raja (2018), which considers resonance a physical process that takes place on the agent-CNS interaction scale and in which these two systems form an overarching dynamic system where an ecological variable constrains a given interaction.

That is, while remaining faithful to the temporal aspect of rhythm, he goes off the beaten track when he decides to base his idea of rhythm on variations of intensity or speed rather than repetition (Dewey 1980, 160). Dewey believes that experience is rhythmic too, as long as it carries within itself

> a summing up and each step forward is at the same time a summing up and fulfilment of what precedes, and every consummation carries expectations tensely forward. (1980, 179)

For Dewey, rhythm is a form of energy rearrangement, common to nature and certain instances of experience, characterized by accumulation and unity; it is not a measurable quantity, but the form of an event:

> an operation through which material effects its own culmination in experience. (Dewey 1980, 153)

I have presented elsewhere a notion of rhythm as "an evolving pattern of oscillations able to entrain other oscillations" (Vara Sanchez 2020, 88). With this definition, I intended to highlight the fact that the necessary condition for a rhythm is its capacity to influence and be influenced by other oscillations and that, when this occurs, these oscillations become part of the rhythm. This conceptualization does not neglect the temporal character of rhythms – it is encapsulated in the word 'evolving' – but makes continuity and pervasiveness their main feature. By this notion of rhythm, I am trying to bring together some aspects already present in the ancient notion of *rhuthmós* – i.e. its nature as an emergent force that constrains us – and Dewey's idea of rhythm as a common feature of nature and experience. This definition aims to make rhythm an extremely relational concept. Rhythm not as a fixed property, but a pattern that emerges from the interaction of (at least) two oscillatory elements. It is almost a fractal phenomenon. Speaking of human beings, we can focus on the emergent rhythm of the contraction of the heart – originating with the interaction of electric impulses generated by cells of the sinoatrial node – but this rhythm can also be regarded as part of a bigger rhythm, along with other mechanical rhythms related to respiration and gastric activity that are reciprocally regulated. And this resultant bodily rhythm can be considered an element belonging to a much more complex rhythm, together with brain and environmental oscillations, all of which enact a dynamic constraint that affects the whole through entrainment.

The idea of rhythms as dynamic constraints stems from the three mutually constraining dimensions of embodiment defined by Thompson and Varela (2001):

> Three kinds of cycles need to be distinguished for higher primates:
> 1. cycles of organismic regulation of the entire body.
> 2. cycles of sensorimotor coupling between organism and environment;
> 3. cycles of intersubjective interaction, involving the recognition of the intentional meaning of actions and linguistic communication (in humans). (424)

They argued that these cycles are reciprocal relationships between neural events and conscious activity (2001, 425). I consider that this idea, in light of recent research, can be expanded and become useful for non-neural rhythmic oscillations insofar as it incorporates a notion of rhythm based on entrainment. In doing so, we can look at the micro level – the interaction of individual oscillators – or at the macro level – the interaction between elements that already behave individually as rhythms – and we will find nested dynamic constraints that affect both specific and general aspects of cognition. Therefore, a definition of rhythm as evolving entrainment is not subject to formal problems of variability and repetition, since we can verify the existence or non-existence of entrainment. I thus believe it is possible to speak of a general cognitive rhythm that works as a dynamic constraint on cognition. Nonetheless, this does not mean that we can register a unitary, constant oscillation along the body. It means that different oscillations originating in places as different as our intestine, the thalamus, or the person we are looking at are connected in such a way that variation in one of these local rhythms affects the whole rhythmicity. Although theoretically, we could assess the strength of a particular constraint – the correlation or anticorrelation in the changes between particular oscillations mediated by entrainment – it would be ill-advised to try and isolate the individual components of the different constraints, given the nonlinearity of cognition; therefore, an idea of nested constraints, although much more complex, would bring us closer to the understanding of the role of these constraints in cognition. The fact that constraints shape cognition does not mean that they only restrict our perceptions and actions. I share the definition of constraints offered by Juarrero, who defines them as "any event, mechanism, or condition that alters a system's probability space" (2015, 514). This conceptualization makes room for the possibility of enabling constraints, those that expand a system's probability space.

From this point of view, rhythm emerges as the form through which ongoing oscillatory processes in the body, brain, and environment enact dynamic constraints on cognition that interact through the nonlinear dynamics of entrainment.

3 The Oscillations behind Rhythm

The most pressing problem with my understanding of rhythm is that it requires the existence of oscillators in the environment, body, and brain able to mutually interact through entrainment. All these regions have to present some intrinsic or self-sustained oscillators able to entrain and be entrained by oscillators originating in the other regions and to contribute measurably to a globally enacted cognitive rhythm. In order to address this need, I will successively discuss (1) bodily, (2) brain, and (3) environmental oscillatory activity with the potential to entrain and be entrained into a global cognitive rhythm.

3.1 Bodily Rhythms and Cognition

Both the heart and the gastrointestinal tract are known to be able to initiate mechanical contractions even if severed from the rest of the body and the brain. Of course, in normal circumstances, these populations of oscillators are under autonomic and hormonal control. However, the relevant fact is that both the cells of the sinoatrial node in the heart and the interstitial cells of Cajal in the gastrointestinal tract generate a rhythm, while other organs such as the lungs require brain inputs to generate oscillatory activity. Beyond organ-specific functions – pumping blood, gut contractions –

> both the heart and the GI tract can be considered as intrinsic oscillators that continuously send information to the brain. Visceral signals can thus be considered as stimuli that influence spontaneous brain activity. (Azzalini, Rebollo, Tallon-Baudry 2019, 488)

That is, activity in the brain is conditioned by the frequency of bodily oscillators. For example, Richter et al. (2017) contend that gastric oscillatory activity causes up to 8% of the variance of one of the most important rhythms of the brain in spontaneous activity: the alpha wave. Another experiment (Lechinger et al. 2015) has shown a correlation between heart rate and the peak frequency of this very same brain wave. It could be argued that there is no such a thing as a visceral rhythm and that the aforementioned examples are just information conveyed through nerves running from the viscera to the brain and only then integrated as bodily states. While I agree that neuronal information is essential for bodily influence on cognition, I maintain that the body is able to modulate brain-originated aspects of cognition through non-neuronal activity. In a recent review, Wagshul, Eide, and Madsen (2011) conclude that research has clearly established the fact that everything whithin the cranial cavity pulsates with cardiac cycles.

This certainly has consequences on the physiology of the brain which in turn shapes the oscillatory activity typical of the brain. Chen et al. claim that "slow changes in systemic brain physiology can elicit large fluctuations in fMRI" (2020, 1), and that the

> spatial heterogeneity of these physiological responses (i.e. respiratory and cardiac) […] can give rise to correlated signals across diverse brain regions that resemble well-known large-scale brain networks. (12)

That is, bodily oscillatory activity constrains brain activity heterogeneously but not randomly. The fact that different brain networks present a particular respiratory and cardiac activity might support the idea that bodily oscillations actively constitute cognition (see Allen et al. 2019 for a model on how cardiac activity influences information processing and behaviour).

The body thus arguably influences cognitive processes not only through neuronal connections but also through non-neuronal oscillatory activity. However, in order to argue for the existence of an enacted reciprocal rhythm, we first need to prove that entrainment takes place within bodily oscillators, and between them and brain oscillators. Entrainment takes place mainly through phase-phase coupling – i.e. the phase of a frequency m drives the phase of another frequency n – which requires an almost harmonic ratio between the frequencies. That is, an oscillatory pattern is more likely to entrain another one that resonates at integer multiples. The fact that several precise frequencies originating in different parts of the body seem to exhibit doubling/halving relationships – the breathing dominant frequencies 0.07 Hz, 0.15 Hz, and 0.30 Hz; muscle activity supporting breathing at 0.60 Hz, a heart rate of 1.25 Hz – and that this geometrical relation expands towards some of the most relevant brain waves – Delta 2.5 Hz, Theta 5 Hz, Alpha 10 Hz, Beta 20 Hz – has led Wolfgang Klimesch (2018) to conclude that brain and body oscillations form a single hierarchy that follows a mathematical law, whereby their frequencies do not vary randomly or arbitrarily (Klimesch 2018, 2448). That is, we can register activity at different parts of the body, but most of these oscillations align into a geometrical relation. I believe that this circumstance favours the emergence of processes of entrainment between the gastric, cardiac, and respiratory rhythms, which shape cognition through neural and non-neural mechanisms. One interesting consequence is the fact that breathing at a frequency of 0.1 Hz – 6 breaths/min – induces high amplitude oscillations in heart rate (Vaschillo et al. 2002), and according to Mather and Thayer this bodily entrainment has a relevant role in cognition, for "heart rate oscillations can enhance emotion by entraining brain rhythms in ways that enhance regulatory brain networks" (2018, 6).

In a recent review on the role of neuronal entrainment, Lakatos, Gross, and Thut concede that

> we know relatively little about how these body rhythms interact with brain rhythms but there is some evidence for body-brain entrainment. (2019, 894)

Indeed, we do not know the precise mechanisms behind this body-brain entrainment, but we do know that everything within the cranial cavity pulsates in correlation with cardiorespiratory activity. And we also know that spontaneous rhythms – but ones which are subject to entrainment – such as breathing, are not only linked to involuntary respiratory-related movements, but also impact voluntary actions by modulating the readiness potential (Park et al. 2020), which supports enactive interpretations (Gallagher 2017, 139-42) of the classical Libet experiments. That is, bodily rhythms of non-neuronal activity not only modulate themselves reciprocally, but constrain the functioning of spatially distant parts of the brain belonging to functional networks, by entraining them through nonlinear dynamics.

3.2 Brain Rhythms and Cognition

Since Hans Berger recorded the first brain wave with an electroencephalography (EEG) in 1924, almost a century of research has aimed to understand what these electric current flows generated by groups of neurons really mean. Nowadays, there is overwhelming evidence that they play an essential role in the timing and coordination of all kinds of cognitive processes. The presence of certain rhythms in a particular region is indicative of a cognitive state; however, this is not to say that they are process-specific. In other words, the same rhythm serves different ends in different regions. This has led some researchers to argue that brain rhythms provide a kind of "neural syntax" (Buzsáki 2010), whose fundamental units would be cell assemblies. The various nested rhythms present in each cell assembly at a certain time would constrain the activity of the assembly – e.g. faster gamma brain waves nested within slower theta ones have been found in many areas of the brain and thus considered an essential element of this neural syntax. It is important to note, though, that

> the individual neurons that compose an assembly may reside in widely separated brain areas but act as a single functional unit through coordinated network activity. (Canolty et al. 2010, 17356)

We are speaking here of assemblies bonded by strong reciprocal connections. Consequently, the activation of a small subset suffices

for the ignition of the whole set. These cell assemblies integrate into large-scale brain networks, such as the default mode, the dorsal attention, the ventral attention, the frontoparietal, the lateral visual, and the salience network. However, the precise number and borders of each network are subject to debate, owing to potential extensive overlapping between them; they are not stable and isolated entities. Najafi et al. (2016) argue that the existence of dense overlapping between the networks is what provides the flexibility to adapt to different tasks and situations. Beyond bodily oscillations, slow brain oscillations, such as alpha or theta waves, seem to play a significant role in constraining the functioning of different areas scattered throughout the brain by affecting their excitability. These processes have been studied in relation to specific cognitive tasks, such as attentional selection (Lakatos et al. 2008), spatial memory tasks (Jones, Wilson 2005), or speech discrimination (Luo, Poeppel 2007). However, even more importantly

> low-frequency brain rhythms are often entrained by external sensory and motor events as well as internal cognitive processes associated with decision making, motivation, and memory. That is, low-frequency phase entrainment combined with phase-amplitude CFC provides a plausible mechanism to coordinate fast, spike-based computation and communication with slower external and internal state events guiding perception, cognition, and action. (Canolty, Knight 2010, 507)

In other words, sensorimotor and internally generated cognitive processes entrain slow brain oscillations that play a role in the coordination of faster local oscillations within cell assemblies. This fact points to the potential role of slow brain oscillations in the integration and segregation of the activity of the different regions composing the large-scale brain networks. Therefore, switching between brain networks in spontaneous (Fox et al. 2009) and task-driven situations (Fox et al. 2005) may be another instance of low-frequency oscillations modulating cognition. Now we have a thread connecting action, perception, oscillatory activity, entrainment, and cognition. Nonetheless, the cognitive picture is arguably even more rhythmic.

In recent years, there has been an increasing interest in so-called travelling waves, or travelling oscillations: emergent and transient oscillatory events that traverse the brain in different directions and at different speeds, and which are believed to constitute another rhythmic layer in the coordination and integration of cognitive processes by modulating neuronal excitability and shaping responses to external inputs. For example, Muller et al. (2016) have found circular patterns that repeat over hours as we sleep, in the form of transient rotating waves at 11-15 Hz originating in the thalamus. These travel-

ling waves synchronize activity in the cortex and arguably play a role in memory consolidation. Another circumstance in which they are involved is sensorimotor coordination. In a study with primates, Zanos et al. concluded that the waves originated by saccadic eye movements reorganize neural patterns "prioritizing the processing of behaviorally relevant stimuli" (2015, 615). It is tempting to relate travelling waves with the enactment of time-extended cognitive processes. That is, while stationary brain waves are more fit to bind aspects of cognition with precise temporal extensions, travelling waves could integrate different levels of temporality into a unitary experience, entraining assemblies of neurons at different levels as they pass. This is supported by Zhang et al.'s research (2018), which shows that theta and alpha brain waves often become travelling waves with a potential role in memory tasks. They have also found that

> different subjects exhibited widely varying types of traveling waves even in the same anatomical region. (Zhang et al. 2018, 1278)

These intersubjective differences suggest that travelling waves – or brain waves behaving as travelling waves – are able to reflect individual cognitive variations. The researchers have concluded that their findings

> emphasize that human cognition is supported by complex, large-scale neural patterns that are exquisitely organized across both time and space. (Zhang et al. 2018, 1279)

Faster oscillations entrained by slower oscillations of stationary and travelling nature seem to be the essential rhythmic scaffolding of the brain.

3.3 Environmental Rhythms and Cognition

Even those researchers who hold stronger views on what entrainment is, such as Lakatos, concede that different sensory modalities are entrained by periodic activity whose phase is close to the appropriate sensory frequency. For example Spaak, de Lange, and Jensen demonstrated that 10 Hz rhythmic visual stimulation induced alpha-band rhythmicity in neuronal activity, whose effects outlasted the stimulation, affecting the subject's perceptual ability (2014, 3542). However, oscillatory activity does not even have to reach the level of conscious awareness to affect cognition. Experiments conducted by Schurger et al. (2017) have shown that undetected auditory regularities entrain voluntary movement. These and related phenomena

appear to be part of a shared mechanism: the rhythmic entrainment of slow cortical oscillations to the temporal structure of a stream of stimuli (Schroeder, Lakatos 2009). However, what happens when there is no clear periodicity? Rimmele et al. have offered a theory according to which

> neural oscillations primarily constitute an intrinsic processing constraint rather than a dedicated temporal prediction mechanism. (2018, 875)

The authors suggest that the entrainment of neural oscillations in processing constraints is present when facing periodic stimuli, but that it is especially important when facing 'aperiodic temporal predictions', as is the case with language and certain types of music.[3] According to Rimmele et al. (2018), periodic stimuli are a bottom-up process in which entrainment is driven by the frequency of the stimuli, while certain aperiodic stimuli require a top-down processing, whereby higher cognitive processes and motor activity align the phase of neural oscillations with an expected event, to facilitate the potential entrainment. Stretching this theory, sensorimotor engagement with periodic oscillatory activity from the environment would be a process of attunement to a similar frequencies, able to drive other resonant frequencies in the brain and body of the agent, by generating a unitary and precise oscillatory constraint that focuses on a specific frequency. An example of this effortless constraint would be the spontaneous entrainment of running cadence to music with a predominant tempo (Van Dyck et al. 2015). However, in the case of aperiodic stimuli, there is a bigger implication of other cognitive processes that enact more complex constraints. These constraints entrain a particular 'doing' that makes us ready to act according to past experiences or preceding moments of the ongoing experience.

Intersubjective reciprocal entrainment is an extremely important phenomenon in most animals and particularly in humans. We constantly and effortlessly attune to one another during social interactions, and we enact shared rhythmic constraints just by walking together. In this case, we participate in the constraint by producing

3 Rimmele et al. explain what these 'aperiodic temporal predictions' are as follows: "temporal predictions inferred from heterochronous streams of events, symbolic cues ('memory-based' predictions; e.g. a yellow traffic light that indicates a switch to red in a few seconds), or hazard functions ('probability-based' predictions; e.g. the increasing conditional probability over time that an event will occur given that it has not already occurred). For example, aperiodic temporal predictions occur in language (cf final section) and in music, where many musical traditions employ a non-isochronous (aperiodic) meter which builds up temporal expectations and can be embodied in dance" (2018, 872).

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and reacting to the sensorimotor cues produced by those we are interacting with. However, even these interactions are far from being automatic or simple processes, for they are modulated by affective aspects of which we are not necessarily aware. In a recent review Hoehl, Fairhurst, and Schirmer summarize the current state of research in interactional synchrony as follows:

> temporal perception is enabled by cortical neuron assemblies and the integration of their signals by striato-cortical loops acting as a central timer or perhaps more generally as a regularity detector. Alignment value depends on socio-emotional computations and informs temporal processes via communication between the temporal and the social brain. (2020, 8)

In a series of experiments, Golland, Arzouan, and Levit-Binnun (2015) found that emotional movies induced similar emotional responses in the participants, but – more importantly – that those who watched the films together presented a tighter coupling in their cardiovascular and electrodermal activity, even in the absence of direct communication between them (participants were asked to refrain from talking and making movements throughout the experiment). The authors suggest that this is the result of

> recursive interpersonal influences, during which individual differences in the intensity and the dynamics of the emotional events were propagated across the co-present viewers, leading to shared emotional experiences. (Golland, Arzouan, Levit-Binnun 2015, 10)

As potential channels of this emotional attunement, they point to "subtle peripheral cues (e.g. facial and postural emotional signals)" and "chemosignals, which do not necessitate conscious allocation of attention" (Golland, Arzouan, Levit-Binnun 2015, 10). Although the mechanisms are yet unknown, these results support the enactment of intersubjective shared constraints mediated by oscillatory activity. The fact that there was a relevantly higher alignment in cardiovascular and electrodermal activity between individuals sharing the experience reveals the role of these oscillations in social bonding. These results support the idea that just sharing an experience, with no further direct interaction, causes the progressive enactment of a nested rhythmic constraint with the participation of brain and bodily oscillations that favour entrainment between those who partake of the experience.

4 Cognitive Rhythm and Nested Dynamic Constraints

An enactive approach should be able to account for embodied, embedded, intersubjective, dynamic, action-oriented process aspects of cognition. In the previous section, I have identified different rhythmic constraints enacted between body, brain, and environment that I consider to be likely participants in a cognitive rhythm that constrains cognition. Some of them, such as the beating of the heart, breathing, and digestive movements, not only serve their specific physiological functions but enact bodily rhythmic constraints that are constitutive of cognition. Bodily oscillations must necessarily occur. That is, their continued activity is necessary for life not only from a mechanical point of view, but also owing to their role in modulating brain and environmental oscillations, organizing them and potentially contributing to their temporal binding. For this reason, a slightly faulty bodily rhythm will not only have physiological consequences, but will also affect cognition. Such is the case with a decreased heart rate variability, which is considered to be a biomarker of mental disorders such as depression and anxiety (Gorman, Sloan 2000). Bodily rhythms are relatively stable, but they have to be flexible enough to accommodate variation, novelty, and the unexpected. Accordingly, Rassi et al. (2019) have found that the coupling between heart rate and breathing frequency is stronger during sleep and when we have our eyes closed while awake than when we are awake and carrying out a memory task. These results are not only consistent with the idea that an overly-rigid bodily rhythm increases the stiffness of the constraint, which in turn would enslave other brain and bodily rhythms, limiting our capacity for sensorimotor entrainment with the environment, but also with the idea that engagement with the environment is able to entrain bodily oscillations. According to what we have seen, an instance of situated cognition such as partaking in a common experience with others, even in the absence of direct interactions, arguably causes the enactment of a shared rhythmic constraint involving brain and bodily oscillations.

Brain oscillations, unlike those originated at the body, are not continuous: certain processes of inhibition modulate the probability of the triggering and frequency of a particular rhythm. That is, certain neuronal assemblies or brain networks will present different oscillations or no clearly defined oscillatory pattern influenced by the different constraints to which they are subject. While bodily oscillations may be considered the *basso continuo* of cognition, brain oscillations are transient and more varied melodies that appear, affect the whole rhythm, evolve, and disappear. Among the different types, slower brain oscillations emerge as particularly important, owing to their apparent role at the crossroads between bodily, environmental, and faster brain oscillations. Specifically, I would ar-

gue that the particular dynamics of travelling waves point to a significant relevance in the integration and modulation of the different rhythms and thus in the enactment of the complex nonlinear dynamics required for cognition. They can be regarded as dynamic constraints that traverse the brain in different directions and patterns, and at different speeds, generating variable windows of excitability in neuronal assemblies and brain networks. The mere movement of the travelling waves suggests a constraining and genetic aspect, as they organize the regions that they traverse spatially and temporally. The substantial differences between subjects and the widely varying types registered in the same anatomical region (Zhang et al. 2018) make these patterns both incredibly difficult to identify and hugely interesting, for they constitute a particular brain-print with cognitive implications.

Varela has argued that different components of temporality require a frame of integration that corresponds to the duration of the lived present (1999, 271). These frames would shape cognition, including our actions, and at the same time would be modulated by them in an endless loop. Accordingly, Gallagher argues:

> At the same stroke, my action incorporates the situation that has been shaped by *past* actions, and by the projected *future* toward which it is moving, in the *present* circumstances that can both limit and enable it. (2020, 40-1; italics in the original)

An expanded version of Rimmele et al.'s theory (2018) of neuronal oscillations as processing constraints comes in handy to address this action-oriented aspect of cognition. By taking together Park et al.'s results (2020) suggesting that respiratory-related movements, impact voluntary actions by modulating the readiness potential and the well-known fact that respiration entrains the brain rhythms involved in stimulus sampling (Zelano et al. 2016), it is possible to view nested rhythmic oscillations that go all the way from the environment to the body as cognitive constraints that influence the organizing and shaping of our sensorimotor engagement with the world. In other words, when we speak of rhythmic constraints the differences between perception and action become blurred. In his seminal paper "The Reflex Arc Concept in Psychology", Dewey, claimed that the

> so-called response is not merely *to* the stimulus; it is *into* it [...] they are always inside a coordination and have their significance purely from the part played in maintaining or reconstituting the coordination. (1896, 359-60; italics in the original)

In my opinion, this coordination is the rhythmic constraint. As we actively explore the world through saccades and more complex involun-

tary and voluntary movements, travelling waves nested within slower bodily oscillations traverse the brain. What we do and what we perceive are just different names given to the same underlying process. Actions and perceptions are rhythmically connected outcomes generated by the same constraint. A rhythm-based understanding of cognition offers the possibility to consider what initially seem to be different processes as interrelated outcomes of a common emerging phenomenon. Rhythms are dynamics with no strict spatio-temporal gaps. They emerge from interactions and affect other interactions while erasing borders between body and brain and between different human beings. As Archilochus said two thousand and six hundred years ago, rhythms hold us all together.

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Emoting the Situated Mind
A Taxonomy of Affective Material Scaffolds

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Abstract Existing accounts of cognitive artefacts are a useful starting point for developing the emerging notion of situated affectivity. Starting from a recent taxonomy of cognitive artefacts, I propose a taxonomy of material affective scaffolds (material objects that we use to support, shape and more generally regulate our affective states). I distinguish representational material affective scaffolds (divided into iconic, indexical and symbolic ones) from nonrepresentational ones (chemical and sensory ones). I conclude by pointing out that the resulting taxonomy is based not only on properties of objects but also on the user's stance towards objects, which in turn depends on other contextual factors.

Keywords Affectivity. Emotion. Scaffolded Cognition. Cognitive Artefacts. Peirce. Representations. Symbols.

Summary 1 Introduction. – 2 Heersmink's Taxonomy of Cognitive Artefacts. – 3 Representational Affective Scaffolds . – 4 Nonrepresentational Affective Scaffolds. – 5 Why Taxonomize? – 6 Conclusions.

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1 Introduction

Much has been written in recent years about cognitive artefacts, defined as

> physical objects made by humans for the purposes of aiding, enhancing, or improving cognition. (Hutchins 1999, 126)[1]

These include compasses, maps, calculators, clocks and many more. Cognitive artefacts are often said to 'make us smarter' because they enable us to solve problems we would otherwise not be able to solve (or only with much greater effort).

The notion of cognitive artefact has been used in philosophy of cognitive science to argue that cognition is not brain-bound but situated in the world. Cognitive artefacts can be characterized more generally as cognitive 'scaffolds': environmental supports with which we interact, and through which we enhance our planning and problem-solving skills (Sterelny 2010). Supporters of the so-called 'extended-cognition thesis' even regard some cognitive artefacts as constituting cognition (Clark, Chalmers 1998; Clark 2008; Menary 2010).

Comparatively less has been written on how artefacts help us have experiences we would otherwise not be able to have (or only with much difficulty) – such as emotional and, more generally affective, experiences.[2] This situation is changing rapidly, however. Over the last decade, various philosophers have started to argue that affective states, too, are environmentally situated.[3] In a recent paper, Piredda draws explicitly on the literature on cognitive artefacts to discuss 'affective artefacts', which she defines

> tentatively [...] as objects that have the capacity to alter the affective condition of an agent, and that in some cases play an important role in defining that agent's self. (Piredda 2019, 1)

Her discussion overlaps in part with Colombetti and Krueger's (2015), who analyse how both material objects and people can function as 'affective scaffolds' in the context of activities of what they call 'affective niche construction'.

1 See also Norman 1991; Kirsh 2010; Heersmink 2013; Casati 2018.

2 I use the term 'affective' here to refer not only to emotions, but also moods and motivational drives such as pain, pleasure, fatigue and so on. For the difference between emotions and moods, see e.g. Stephan 2017.

3 Griffiths, Scarantino 2009; Krueger 2014a, 2014b; Stephan, Walter, Wilutzky 2014; Colombetti, Krueger 2015; Colombetti, Roberts 2015; Roberts 2015; Colombetti 2016; Krueger, Szanto 2016; Piredda 2019; Candiotto, Piredda 2019; Saarinen 2020.

My aim in this paper is to add a further piece to this emerging literature by continuing to unpack and develop the view that we use material objects to scaffold our affective states. I prefer to talk of objects as affective 'scaffolds' rather than 'artefacts' because, even though the majority of affective scaffolds I discuss below are indeed artefacts (human-made objects), the notion of 'scaffolds' is broader and includes also naturally occurring objects. My aim, specifically, is to distinguish different types of 'material'[4] affective scaffolds more systematically than done so far. This work is needed not only to catch up with the literature on cognitive scaffolds but also to further our understanding of how the human mind, in its experiential and affective dimension, is shaped and structured by the environment – an important step in continuing the '4E' project of challenging the widespread view that the machinery of the mind is entirely or even primarily in the head.

In what follows I begin by presenting Heersmink's (2013) taxonomy of cognitive artefacts (§ 2). Then I apply it to affective scaffolds, tweaking it along the way as I see fit. I distinguish representational and nonrepresentational affective scaffolds, dividing them into further taxa: iconic, indexical and symbolic scaffolds (§ 3), and psychoactive and sensory ones (§ 4), respectively. In section 5 I reflect on the resulting taxonomy, comparing it with Heersmink's and clarifying how it should be interpreted as part of the broader project of analysing the phenomenon of affective scaffolding.

2 Heersmink's Taxonomy of Cognitive Artefacts

Among existing discussions of cognitive artefacts is Heersmink's (2013) taxonomy, which is influenced by Peirce's theory of signs and Kirsh's (1995) notion of 'intelligent use of space'. Heersmink offers this taxonomy as

> a first step towards a better understanding of the range and variety of cognitive artifacts (2013, 465)

and as a

> point of departure, both for conceptualizing how different artifacts augment or impair cognitive performance and how they transform and are integrated into our cognitive system and practices. (2013, 465)

4 As in Colombetti, Krueger 2015, I use 'material' to denote objects rather than people. People are material too, of course, but it is not uncommon to use 'material' to refer specifically to objects – as in 'material culture studies'.

He begins by distinguishing the two broad genera of 'representational' and 'nonrepresentational' cognitive artefacts. He notes that most existing accounts of cognitive artefacts characterize them primarily as representational – namely, as aiding cognition in virtue of referring to, or being about, something else (as in the case of maps and written text) (e.g. Norman 1991; Nersessian 2005; Casati 2018). Yet, he adds, cognitive artefacts can also be 'nonrepresentational' when they aid cognition without referring to anything else.

Heersmink further divides these two genera into 'species'. Drawing broadly on Peirce's semeiotic, he divides representational cognitive artefacts into 'iconic', 'indexical' and 'symbolic' ones. Iconic artefacts, he claims, represent in virtue of being highly isomorphic with what they refer to (as in the case of maps and knitting patterns). Indexical artefacts represent in virtue of having a direct causal connection with the objects they refer to (as in the case of the length of the mercury column of a thermometer, which represents temperature; or the direction of a flag, which represents the direction of the wind). Symbolic artefacts represent in virtue of "shared use, agreement, and logical rules" (Heersmink 2013, 474) (as in the case of written words or mathematical notations). Still following Peirce, Heersmink notes that most artefacts represent in more than one way at the same time. For example, a flag is also iconic, as there is an isomorphism between its direction and that of the wind. Nevertheless, Heersmink thinks it is useful to characterize token artefacts as 'predominantly' iconic, indexical or symbolic (see also Atkin 2008).[5]

Drawing mainly on Kirsh (1995), Heersmink then divides nonrepresentational cognitive artefacts into 'spatial' and 'structural' ones. Spatial artefacts aid cognition in virtue of their location in space. One uses space intelligently when, for example, one consistently places one's car keys in the same place at home, so that one will know where they are without having to look for them each time; or when one places the article one intends to read next on top of a pile of other papers. Structural cognitive artefacts, on their part, aid cognition in virtue of their (concrete or virtual) structure – as when Scrabble players rearrange letter tiles to recall words more easily, or when Tetris players rotate virtual zooids to find the orientation that best

5 An early account of this tripartition can be found in Peirce (1867). Peirce's theory of signs is notoriously difficult and complex, partly because for forty years he kept modifying it (Liszka 1996; Atkin 2013). As the aim of this section is to summarize Heersmink's taxonomy, I won't engage with the subtleties of Peirce's semeiotic here, nor question Heersmink's interpretation of Peirce. It is worth at least briefly stressing, however, that according to Peirce index, icon and symbol are not three separate entities but rather modalities of semeiotic functioning that are always present together in all kinds of signs. A taxonomy of objects rigidly based on separate semeiotic categories is thus arguably not in line with Peirce's intentions (thanks to an anonymous reviewer for pointing this out).

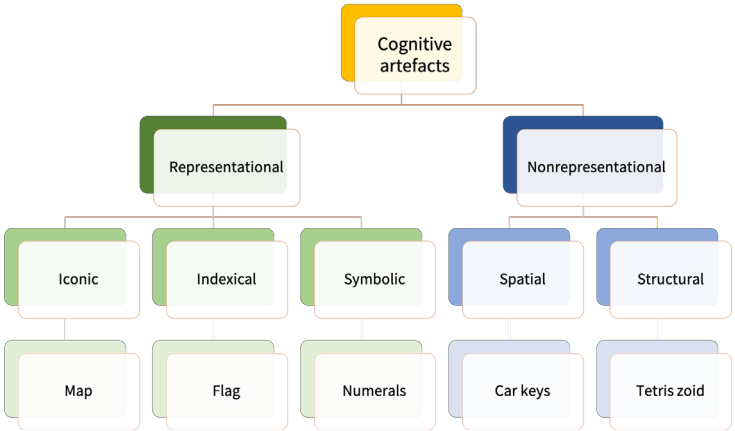

Figure 1 Heersmink's taxonomy of cognitive artefacts (adapted from Heersmink 2013, 473)

fits the socket at the bottom of the computer screen. The resulting taxonomy is summarised in figure 1.

3 Representational Affective Scaffolds

Whether what Heersmink calls 'spatial' and 'structural' cognitive artefacts are in fact nonrepresentational has been questioned (Fasoli 2018). As I discuss in the next section, in my view those two categories are indeed problematic and should be dropped. Accordingly, it may well be that cognitive artefacts, when defined as human-made tools with specific functions, are such mostly, or even only, because they represent something. For present purposes, however, we need not worry about this issue. What I want to draw attention to, instead, is that the representational vs. nonrepresentational distinction can be applied to affective material scaffolds, allowing us to say something important about them: namely, that whereas some objects influence our affective states (or, more succinctly, 'affect us' or just 'affect') because they refer to something else, others do so in virtue of their material properties as such. In this section I look in more detail at the first case, and in the next section at the second.

Heersmink's Peircean tripartition into iconic, indexical and symbolic cognitive artefacts can be applied to affective scaffolds. We can thus distinguish:

- iconic affective scaffolds, which affect in virtue of resembling something else;

- indexical affective scaffolds, which affect in virtue of being causally connected with something else;
- symbolic affective scaffolds, which affect in virtue of referring to something else by convention.

Good examples of iconic affective scaffolds are pictures or paintings of loved ones, and more generally of personally significant people, places or even objects. Sounds and music can also affect people iconically, for example when they imitate nature (e.g. streams, wind or bird songs). Of course, anything can resemble anything else along some dimension; there is indeed a complex debate on whether iconicity or resemblance is sufficient, or even necessary, for representation (e.g. Goldman 2003). As I clarify in section 5, my suggestion ultimately will be to interpret this classification as capturing how people interpret objects as part of affective scaffolding activities. From this user- (rather than object-) based perspective, what makes an object an iconic affective scaffold is that it affects one based on some resemblance that person perceives. Likewise, as I shall discuss, for indexical and symbolic affective scaffolds.

Indexical affective scaffolds include objects that affect one because they remind one of some past event, person or situation of which the object in question was a consequence. These objects correspond to what Heersmink, in a different paper, calls "autobiographical objects" (Heersmink 2018; see also Turkle 2007). Examples abound – from holiday souvenirs, to mementos of a first date or an adventurous trip, to objects that belonged to deceased loved ones, to music one used to listen to with someone or that was played by someone who affected one in some way. The experiences elicited by these objects can be nostalgia and longing for the past event, person or situation; or they can be re-enactments of past feelings (awe in front of a certain landscape, love and attraction for a certain person, and so on). Note that autobiographical objects may affect also in virtue of iconic features. For example, a magnet in the shape of the Eiffel Tower may affect me in virtue of its resemblance to the actual Eiffel Tower. Holiday souvenirs, however, typically affect because the person herself buys them when on holiday, i.e. because of a certain existential connection or "correspondence in fact" (one of Peirce's characterization of indices; see Peirce 1867, 294; see also Atkin 2005). A magnet in the shape of the Eiffel Tower will not affect me in the same way if it is something I bought myself just after climbing up the Eiffel Tower (say), or if it is a gift from a friend and I have never even been in Paris (see also § 5).

Indexical affective scaffolds also include objects that affect us because they are given to us by someone as signs of gratitude or love. My grandmother used to knit scarves and sweaters for me, and to give them to me saying "This is for my dearest granddaughter with all my love". Thus, those objects touch me because, as products of my grand-

mother's love for me, they remind me of such love. Thank-you cards and other gifts can work in the same way. They are the consequence, or expression, of feelings of gratitude; as such, they work as indexes of those feelings and can thus function as indexical affective scaffolds.

The class of symbolic affective scaffolds is particularly vast and complex. Innumerable objects affect us because they refer to something else by convention. A simple example is the wedding ring, which can strengthen one's feelings of connection with one's spouse as a symbol of commitment and faithfulness. More complex examples include objects employed in religious practices and various types of artworks (paintings, sculptures, music etc.). Religious practices make ample use of symbolic material objects for the purpose of affective transformation. There are innumerable examples: crosses, golden and silver objects, incense, labyrinths, candles, relics and more. The characterization of religious symbols as affective scaffolds fits well with Geertz's (1973) definition of religion as a system of symbols (including material objects) aimed at "[establishing] powerful, pervasive, and long-lasting moods and motivations" (Geertz 1973, 90). Geertz importantly emphasizes the ritualistic-performative dimension of religion, attributing a double role to it. On the one hand, it is during rituals that religious symbols acquire their specific meanings, and/or that those meanings are reinforced. On the other hand, rituals are means through which meanings become psychologically inscribed or internalized, determining long-term dispositions to feel and behave in certain ways. As Geertz writes, the "concrete symbols" of a religion

> [induce] in the worshipper a certain distinctive set of dispositions (tendencies, capacities, propensities, skills, habits, liabilities, pronenesses) which lend a chronic character to the flow of his activity and the quality of his experience. (1973, 95)

For Geertz, religious symbols are in fact tools that enable, and even instruct, people how to feel – and, importantly, how to feel 'specifically'. Through its distinctive symbols, each religion gives specific direction, order and form to what would otherwise be chaotic or uncanny experiences.

As one concrete example out of many possible ones, let us consider the Easter Vigil service in the Roman Catholic tradition. This service takes place in the hours of darkness before Easter Sunday. It begins outside the church, where the congregation gathers around a fire. The priest blesses the fire and uses it to light the Paschal candle, into which he also inscribes a cross and other symbols. At this stage he speaks the words: "May the light of Christ rising in glory

dispel the darkness of our hearts and minds".[6] A deacon then carries the candle into the church through the central nave, in darkness, followed by a procession of people holding unlit candles. Once in the church he raises up the Paschal candle three times while singing "The light of Christ". As he proceeds, those attending the service gradually light their candles from the Paschal candle. As the latter is finally placed in the middle of the sanctuary, the lights of the church are switched on. This part of the service is followed by the singing of the Proclamation, which includes explicit references to darkness and light; for example:

> This is the night that with a pillar of fire banished the darkness of sin […] This is the night, when Christ broke the prison-bars of death and rose victorious from the underworld […] Christ your Son, who, coming back from death's domain, has shed his peaceful light on humanity, and lives and reigns for ever and ever.

During this service, the words spoken by the priest indicate that light produced by fire symbolizes Christ and his power to dispel sin and death, in turn symbolized by darkness. The service can thus be seen as a performance intended to communicate the idea that Christ has the power to redeem humanity without weakening (just as the fire from the Paschal candle can illuminate the small individual candles without dimming) and that through his resurrection humanity is saved (light spreads and defeats darkness). It is clear that the service aims to induce an affective transformation in the participants. It is theatrical, and uses darkness and light not just to represent and convey the concept of salvation through Christ's resurrection but also to touch and move the congregation. Over the course of the service, attendees are meant to experience the uplifting power of light as it overcomes darkness. They move from the gloomy and lonely atmosphere of unlit spaces, where they cannot see or interact with other participants, to the welcoming and uplifting atmosphere of the fully lit church, and a renewed sense of togetherness. The sensory qualities of darkness and light clearly play an important role in facilitating this affective transformation (see § 4). Yet knowledge of their symbolic meaning, explicated and underscored by the words uttered by the priest during the service, further enhances their affective power.

When it comes to art, some objects are more deliberately symbolic than others. European paintings from various historical periods are loaded with symbols that influence how the perceiver interprets the painting and, relatedly, how the painting affects the perceiver. This is also why knowing the symbolic meaning of objects portrayed

6 For the description of the service I followed Catholic Truth Society 2012, 311-21.

Figure 2 Osias Beert. *Still Life with Cherries in China Bowls*. 1608

in this type of art can add greatly to the perceiver's experience. Consider for example the painting *Still Life with Cherries in China Bowls* by the Flemish artist Osias Beert (1580-1624) **[fig. 2]**.

This work depicts various objects on a table, including a bread roll, an oil lamp, a dragonfly, a knife, a bowl of strawberries and one of cherries. A naïve viewer who looks at this painting without awareness of its symbolic meanings will probably be affected primarily by its light, colours and shapes. When I first saw this painting as such a naïve viewer, I was attracted in particular by the vivid red of the fruit and the realistic qualities of the bread, especially by comparison with the gloomy darkness of the background. I only briefly noted the insect and knife in the foreground, and thought they were there mainly just to enhance the realism of the scene. I then read that the cherries and strawberries are meant to represent the souls of human beings, and the dragonfly the devil waiting to corrupt them (Pound 2018). This information significantly changed my affective response to the painting. Now, when I watch it, I see the previously seemingly insignificant dragonfly as ominous. Its stillness and apparently accidental presence creates an affective tension as I imaginatively anticipate it starting to lift and fly threateningly over the fruits. The redness of the fruit is not attractive or pleasing anymore. Rather, it bears disturbing associations with guilt and existential suffering (and even blood), making me think of the damned souls in the burning red flames of Dante's *Inferno*. Awareness of the symbolic meanings of the painting has thus considerably changed its impact on my affective experience.

Much more could be said, of course, about the affective impact of symbols in art – not just in painting but also sculpture, music, theatre, and so on. And there are other domains where symbols are

explicitly created and used to influence our affective states, such as branding and advertising. Yet hopefully these few examples are enough to illustrate the general point that objects can be symbolic affective scaffolds.

4 Nonrepresentational Affective Scaffolds

It is clear that many objects also affect without referring to anything else, and can thus be characterized as 'nonrepresentational' affective scaffolds. How can we analyse these further? Heersmink's (2013) taxonomy, in this case, does not seem useful. Arguably, this is because his distinction between spatial and structural cognitive artefacts is problematic to begin with. First, structure, after all, exists in space. When we say that objects have a certain structure we refer to how their parts are organized in space. When we rearrange Scrabble tiles to facilitate word retrieval, we rearrange those tiles in space. Indeed, in Kirsh's (1995) paper (from which Heersmink draws), the examples of rearranging Scrabble tiles and of leaving the car keys in the same spot are both meant to illustrate the same phenomenon – the intelligent use of space. Second, it does not seem appropriate either to talk of 'spatial cognitive artefacts'. What Kirsh originally emphasized is that, more often than we may think, we arrange and move objects in space to simplify our planning and problem-solving tasks. In order to capture this phenomenon, it seems more accurate to talk, for example, of the 'use in space' we sometimes make of objects to solve problems (rather than to categorize objects in some contexts as 'spatial cognitive artefacts').

Given that this part of Heersmink's taxonomy is problematic, I propose to drop it and to divide nonrepresentational affective scaffolds instead into 'psychoactive' and 'sensory' ones. By 'psychoactive scaffolds' I refer to items that users introduce in their body because of their global effects on consciousness (such as changes in mood, or increased alertness or relaxation). By 'sensory scaffolds' I refer to objects that affect users in virtue of sensory qualities and accompanying hedonic tone.

Prototypical psychoactive affective scaffolds are psychoactive (or 'psychotropic') substances, called this way because they induce altered states of consciousness. Many of us regularly introduce into our organism a variety of these substances (from caffeine to nicotine and alcohol, to antidepressants, anxiolytics, and illegal drugs) to be more or less alert, relaxed, optimistic, joyful, euphoric, and so on. Humans have consumed these substances since prehistoric times, and today we know that their consciousness-altering function depends on the specific action of a variety of neurotransmitters (e.g. dopamine, serotonin, norepinephrine) at synaptic level. These substances influence

our affective state without referring to anything else (although they can, and often are, incorporated into practices which attribute e.g. symbolic meanings to them; see below). Importantly, I understand the class of psychoactive affective scaffolds broadly, to include objects containing substances that are not standardly defined in physiology as 'psychoactive', but that also lead to alterations in consciousness (especially in mood and energy level) when inserted into the organism. Foods containing simple carbs (sugars, refined grains etc.) are good examples. Eating these foods leads to an experience of increased energy (due to a rapid increase in glucose). More generally, our motivational drives often depend on the organism's need to maintain homeostasis; hence we drink when thirsty, eat when hungry etc. The substances we take in response to these drives can affect us (e.g. by giving a sense of satisfaction and restoring good mood) and as such fall into the category of psychoactive affective scaffolds.

Sensory affective scaffolds include all sorts of objects that influence our affective states through their sensory qualities – colours, pitches, tastes, scents, textures, and so on. Sensory qualities are experienced through the senses.[7] The most obvious way in which they affect us is through their hedonic character – their felt pleasantness or unpleasantness. Why and how we find some sensory qualities pleasant or unpleasant is a complex empirical question (e.g. Miskovic, Anderson 2018). Staying at the phenomenological level, it seems that when we find sensory qualities pleasant or unpleasant, we experience their hedonic character 'together with' the sensory quality itself (e.g. we experience a certain scent 'as' pleasant). This is most evident in the case of scents and tastes, but arguably also applies to colours, sounds etc. Given that hedonic tone is typically regarded as a dimension of mood (e.g. Russell 2003), pleasantness/unpleasantness is likely to influence mood (see Herz 2009, for instance, for evidence that scents experienced as pleasant/unpleasant improve/worsen mood). Generally speaking, seeing pleasant sights, tasting pleasant tastes, smelling pleasant scents, and so on, will increase a person's overall 'positive affect' and thus incline her toward a more positive mood (feeling good, happy, uplifted, content); vice versa for unpleasant hedonic tone. In addition, arguably sensory qualities can also affect in more specific ways (which will often depend on the type of object involved): they can, in various degrees and combinations, stimulate, energize, uplift, relax, bore, arouse, surprise, comfort, please, annoy, fascinate, absorb, attract, repel, disgust, seduce, and

7 For convenience, in this paper I follow ordinary language here and say that we experience, or perceive, colours, sounds, tastes etc. I do not, however, endorse the objectivist view that sensory qualities exist independently of the perceiver. My preferred view is that sensory qualities are 'enacted' in the encounter of the perceiver and the perceived (Varela, Thompson, Rosch 1991; Thompson 1995).

so on. Overall, it seems correct to say that objects can affect us non-representationally in virtue of their sensory properties *qua* sensory properties (namely, without the user taking the sensory properties to refer to or indicate something else) – as when my mood is lifted by smelling a rose or a freshly baked loaf of bread, or when I am seduced by a luminous shade of dark cobalt blue in the sky, just before darkness. As such, these objects are best characterized as non-representational affective scaffolds.

Importantly, because we typically experience objects through more than one sense at once, objects may affect us in different ways at the same time, generating quite complex sensory-related affective states. Pizza, for example, has a certain scent and taste but also colour, texture and even sound (compare the sound of a crisp thin Roman-style pizza with that of a gooey thick Chicago-style one). Each of these properties individually considered can affect. Yet, when one eats pizza, these sensory properties are combined together, generating a complex affective experience. This point applies to eating any other food, of course, and generalizes to other activities and their combinations. Every moment of consciousness arguably usually involves a multisensory experience. As I type these words I feel the keys under my fingers, hear the noise the keys make when pressed, and see the rest of the screen and its background.[8]

One may want to question the distinction between psychoactive and sensory affective scaffolds by pointing out that some senses – taste and smell – are characterized as 'chemical senses'. Unlike sight and hearing, taste and smell involve contact between chemical molecules in the environment and (chemo)receptors in the tongue and nasal cavity.[9] In fact, touch is also in part a chemical sense, as it can involve the chemical activation of nerve endings in soft tissue (chemesthesis), giving rise to sensations of stinging, tingling, cooling and burning (Smith 2015). It may thus seem that the distinction between sensory and psychoactive affective scaffolds does not hold because scents, flavours and psychoactive scaffolds all affect one in virtue of processes involving chemical substances and chemoreception.

I do not think this consideration undermines the distinction. Conceptually and experientially, there is a clear difference between perceiving sensory qualities through exteroception (a process which, in

8 I am considering here only sensory stimuli that are consciously perceived. However, we can also be affected by sensory stimuli that are only subliminally perceived. For example there is evidence that our affective state is influenced by odorants that are not consciously perceived (Sela, Sobel 2010). This may be due to the nature of the odorant, learnt associations and/or the psychoactive properties of some odorants (see below, main text).

9 For an accessible introduction to sensory physiology, see Widmaier, Raff, Strang 2014, ch. 7.

the case of smell and taste, happens to involve chemoreception rather than e.g. photoreception) and undergoing alterations in consciousness due to the insertion into the organism of substances that alter neurotransmission in the brain, but are not sensed. In fact, the distinction is also valid at the physiological level: chemoreception is involved in both cases, but in the case of taste and smell the processes that define those senses as 'chemical' occur in the sensory organs, whereas in the case of psychotropic drugs they occur in the brain.

To clarify the difference further, consider coffee. Coffee possesses chemical components that stimulate bitter taste receptors (primarily located on the tongue). This process is mainly responsible for the sensed bitterness of coffee. Among the components of coffee is caffeine, which apparently contributes only minimally to bitterness, yet acts on the central nervous system as a psychoactive substance (it binds with adenosine receptors in the brain, blocking the absorption of adenosine – an inhibitory neurotransmitter which reduces heart rate and promotes sleep) (Poole, Tordoff 2017). When one drinks coffee to feel less sleepy and improve concentration, it is the psychoactive properties of caffeine that one exploits, and coffee thus functions as a psychoactive affective scaffold. When, on the other hand, one drinks coffee because one likes its taste, then coffee functions as a sensory affective scaffold.[10]

Thus it is not that the distinction between psychoactive and sensory affective scaffolds does not hold, but rather that certain items can function both as sensory and psychoactive affective scaffolds. Incense is another example. Smelling incense involves the detection of chemical molecules through chemoreceptors in the nose. When this scent is experienced as pleasant and used to create a pleasant environment, we can say that the incense functions as a sensory affective scaffold: it is its scent, as sensed and liked, that affects. However, incense also contains molecules that make it into a psychoactive substance. In a study on mice, Moussaieff et al. (2008) showed that incensole acetate (a component of incense) has anxiolytic and antidepressant effects, and suggested that this is why incense is used widely across cultures in religious rituals. If this is right, incense also works as a psychoactive affective scaffold.

10 How one comes to enjoy the bitterness of coffee is a difficult question (Poole, Tordoff 2017). Given that bitterness is usually disliked (it typically is in children and most animal species) because it is associated with toxic substances, one possibility is that it is the uplifting effect of caffeine that, by association and anticipation, makes one like and seek coffee. Even so, however, I would still say that the bitterness of coffee, when enjoyed, is best regarded as a sensory affective scaffold – because it is the 'sensed bitterness' that is enjoyed (note also that whereas the sensation of bitterness is immediate, the pick-up induced by caffeine takes longer to kick in – from 10 to 45 minutes). Analogous considerations apply to the following example of incense, in the main text.

A more interesting complication is that psychoactive and sensory scaffolds are often integrated into practices that associate them with cultural meanings, and thereby also count as representational affective scaffolds. Coffee is again a good example, and wine an even better one. One may drink wine because of its pleasant sensory qualities and/or its psychoactive effects (in which case wine works as a nonrepresentational affective scaffold). But the drinker may also be a connoisseur who associates the wine with a specific vintage and *terroir*. These elements will add further layers to the affective experience accompanying wine drinking. Wine in the case of the connoisseur is not just a nonrepresentational psychoactive scaffold, but also a representational one (mainly an indexical one).

More complex examples are entheogen substances (psychoactive substances used for spiritual goals) used in collective rituals – such as the *ayahuasca* ritual performed by people in the Amazon (Labate, Cavnar 2014). These substances are attributed symbolic meanings that add up to their affective scaffolding power. In the case of the *peyote* cactus that grows in Central America, its primary psychoactive ingredient is mescaline, and the most commonly reported effects of its ingestion are visual and auditory hallucinations, feelings of contentment, wellbeing and calmness, and muscle relaxation. These effects make the cactus into a nonrepresentational affective scaffold. However, the *peyote* also has various cultural symbolic meanings. Users generally believe that it allows them to communicate directly with a spiritual realm of existence (Issitt, Main 2014). Many Native Americans regard the cactus as a medicine with God-given properties, and as an omniscient and compassionate personality or spirit. It is also called 'Mother Peyote' or 'Father Peyote', and is associated with symbols of origin, dawn and birth (Calabrese 1994). These associations make the *peyote* into (also) a representational affective scaffold.[11]

5 Why Taxonomize?

Having gone through the exercise of applying Heersmink's approach to affective scaffolds, I now want to pause to reflect on what has been achieved. *Prima facie*, what we now have is a taxonomy of material affective scaffolds **[fig. 3]** that broadly mirrors the one of cognitive artefacts presented in section 2.

Importantly, however, I regard this taxonomy differently from how Heersmink's regards his. He explicitly presents his approach as "ar-

11 More could be said about this topic, especially about how one arguably needs to learn to use psychoactive substances in social-ritual contexts to be affected in the desired way (Becker 1953).

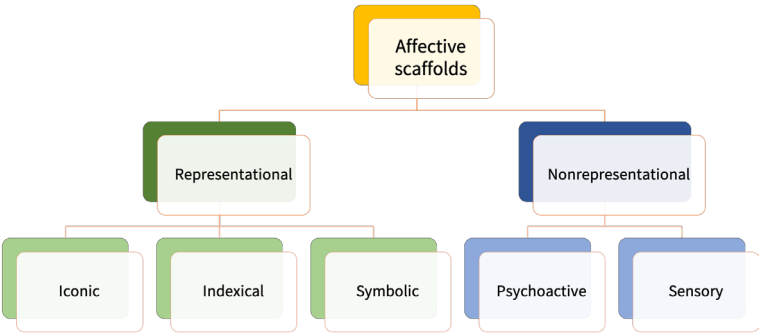

Figure 3 A taxonomy of affective scaffolds

tifact-centered" (2013, 472) to offset the prevailing anthropocentrism of others' categorizations. As he writes:

> I take as my point of departure the specific properties of cognitive artifacts and then categorize them on the basis of those properties, not on the properties or goals of the agents that design, make, or use them. (Heersmink 2013, 472)

His taxonomy arguably captures salient features of objects that may explain why they are typically used the way they are. Yet entirely to bracket the user and her goals seems to me problematic, especially if the aim is not just to analyse objects *per se* but objects that are used in mind-altering or mind-supporting activities. Affective scaffolding, as characterized by Colombetti and Krueger (2015), is indeed such an activity: it is a form of affective regulation that involves not just processes of 'internal' cognitive reorganization (distraction, re-appraisal, evaluation of coping potential; Gross 2015) but also object-involving activities (see also Krueger 2014a). As I see it, the main distinction between representational and nonrepresentational items is useful precisely because it captures the important general fact that, in the context of such activities, the user may or may not take an 'interpretive stance' towards objects. When she does, we can characterize the item as a representational scaffold; when she does not, as a nonrepresentational scaffold. The user's stance in the context of a specific affective scaffolding activity thus contributes to determining the object's position in the taxonomy.

Thus, iconic, indexical and symbolic scaffolds are such because of how the user interprets them. When a person uses an object to influence her affective state because of some similarity she perceives between that object and something else, that object is (for her) an iconic affective scaffold. In my view, this is why the notion of an iconic

affective scaffold is useful in the first place: it explains why the user relates to an object (for the purposes of affective regulation) in the way she does – that is, it is a category for phenomenological description and psychological explanation. Likewise, I take the notion of an indexical affective scaffold to refer to an object that a person uses because she sees a certain causal connection between that object and something else. Likewise, too, for symbolic affective scaffolds, which I regard as such because of some arbitrary connection the user perceives or establishes between them and something else.

Of course, the user can be wrong or idiosyncratic in her interpretation of the object. She could be mistaken in seeing, say, a causal connection where in fact there is none. For example, she might value her scarf because she thinks it was knitted by her beloved grandmother when in fact, unbeknownst to her, it was not (say the scarf has no connection at all to her grandmother). The scarf, in other words, is not an index of her grandmother. Still, for the purposes of phenomenological description and psychological explanation, it is useful to say that, for the person, the object functions as an indexical affective scaffold. This notion captures how the person sees/feels the object, and relatedly why she values it and uses it to regulate her affect. Similarly, if a person values an object and uses it to regulate her affective state on the basis of a resemblance only she perceives between the object and something else, again the suggestion here is that the object counts as an iconic affective scaffold (even though, it might be argued, it is not an icon). Likewise for symbolic affective scaffolds.[12]

On the nonrepresentational side of the taxonomy, properties of objects are more relevant in determining what kind of affective scaffold an object is. Psychoactive and sensory scaffolds can affect just in virtue of their physical properties, without the user taking an interpretive stance. Of course, the user needs to be sensitive to those objects for them to affect her (colour is not calming for a blind person; coffee is not a pick up for someone not sensitive to the psychoactive effects of caffeine), and this sensitivity may in turn vary with context and even with the user's goals and intentions. Nevertheless, the main point is that, in order to affect, nonrepresentational scaffolds need not be interpreted by the user as referring to something else.

Overall, then, what place in the taxonomy an object occupies will depend on whether or not the user interprets it; and if so, how. The wedding ring, for example, will function as a symbolic affective scaf-

12 It may be asked whether some affective responses or some affective uses of objects are more appropriate than others. What counts as an 'appropriate' or 'inappropriate' affective response or use is an orthogonal issue (and a complex one) that I do not intend to address here. My aim here is just to describe a widespread psychological phenomenon – namely, that people can interpret objects in different ways and that these different interpretations often determine different affective responses to those objects.

fold when it is interpreted according to convention as referring to a commitment to faithfulness. The same user could, however, relate to the wedding ring in a different way – perhaps as a memento of when the ring was put on her finger during the wedding ceremony. In this case the ring will function as an indexical affective scaffold (and, importantly, in virtue of this different interpretation it could elicit different affective states). Or, the same wedding ring could affect the user in virtue of its sensory qualities (e.g. shininess, heaviness) without being taken to refer to anything else – in which case it will function as a nonrepresentational sensory affective scaffold. In fact, I often wear my wedding ring because of the physical comfort I get from feeling something around my finger – a comfort I get from wearing rings more generally. Or consider pizza again. I like to make pizza every Sunday night during the damp and dark winter months, to cheer me up. This activity brings me joy and comfort through its multisensoriality – the changing and intensifying scent as the pizza bakes, and all the many other sensory pleasures that accompany eating pizza. The pizza is also a psychoactive scaffold in virtue of its high carb content. Additionally, making pizza is for me a way of retaining a sense of identity. I have been making pizza on Sunday nights since I was a university student, and I have fond memories associated with conviviality when I make and eat it. My pizza thus also functions as an indexical affective scaffold. Similarly, a cigarette functions not only as a psychoactive affective scaffold (although it probably always does in smokers, unless it contains no nicotine); smokers often say they enjoy various sensory aspects of smoking (such as holding the cigarette in their hand and mouth). In the context of ritual, the *peyote* works as a psychoactive and symbolic affective scaffold. A picture of one's parents can be an iconic but also an indexical and sensory affective scaffold. And so on. In sum, token objects do not fall under just one taxon **[fig. 4]**.

Importantly, some uses of objects as affective scaffolds will be determined primarily by sociocultural norms and expectations, while others by personal history. In Western cultures, to interpret a wedding ring as a symbol of commitment to faithfulness is in line with sociocultural expectations. In fact, the wedding ceremony is arguably structured precisely to 'inscribe' such meaning into the rings – with the rings being exchanged just after the pronunciation of the vows. Alongside these socioculturally mediated interpretations, however, there can be a range of other, more idiosyncratic interpretations. In my particular case, my wedding ring also often makes me giggle, as it reminds me of a joke my husband made on our wedding day about our rings.

A related implication of this understanding of the taxonomy is that what type of affective scaffold an object is will also depend on individual differences among users. In spite of some commonalities (e.g. most if not all humans like sugar, salt and fat), we generally develop

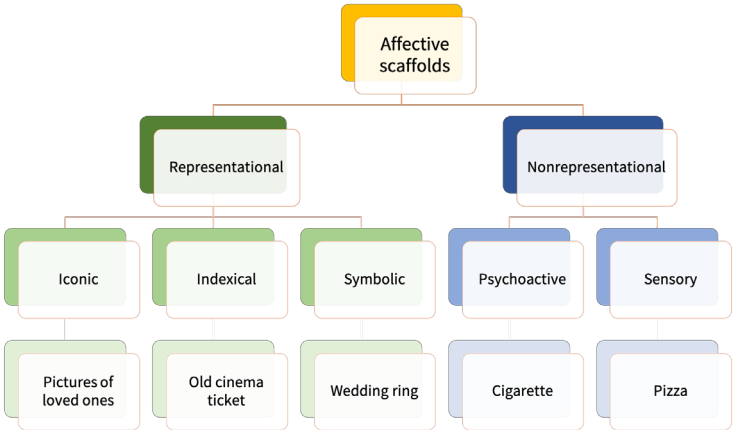

Figure 4 The same object can function as a different type of affective scaffold.

personal preferences for certain sensory stimuli and activities, and have different aims, concerns, personalities and so on. The same object will thus function as a different type of affective scaffold for different people, and even function as a scaffold for one person but not for another. People have different tastes when it comes to home décor, for example (some are minimalists, others maximalists); some find sacred music uplifting, others boring; some like to wear small rings, some big ones, some many ones, and others fewer or none; some find ironing relaxing, others loathe it, and so on.

Finally, individual differences in training and personal history will also determine how people relate to objects. Of course, only some people learn to use certain objects for affective regulatory purposes (as in the case of musical instruments). Less obviously, how people relate to objects also depends on whether and how they pay attention to objects and to how objects affect them. Our sensitivity to things is not unalterable. Appreciation can be trained and cultivated, and not just for 'highbrow' art and objects such as fine wines. We know from mindfulness practices that we can change our stance toward everyday objects and activities, and thereby change how these affect us (e.g. Bays 2009). How much training one has in these practices will then influence how one is affected by objects. Likewise for cultural norms, that also determine how people relate to and are affected by objects. In Japan, for example, the cultural centrality of the aesthetic quality of *wabi* (impermanence and imperfection) will influence how people relate to, look at and appreciate certain objects.

To come full circle, what about Heersmink's taxonomy of cognitive artefacts? Is it appropriate to regard it as 'artefact-based'? This

question requires a longer elaboration than I have room for here. Briefly, it seems to me that a taxonomy of cognitive artefacts cannot entirely bracket the user (see also Fasoli 2018). For an artefact to be cognitive in the first place it means that it is used to aid some cognitive/epistemic process, which will depend on the user's goals, skill, level of cognitive development, and so on. Thus, if the ultimate aim of taxonomizing artefacts is to explain how they aid cognition, then it seems that more attention will need to be paid to the user too, in various respects.

6 Conclusions

This paper has proposed a taxonomy of affective scaffolds, starting from Heersmink's (2013) taxonomy of cognitive artefacts. This exercise has produced various insights that I hope are valuable for further developing the emerging situated approach to affectivity. The original taxonomy had to be tweaked a bit, and may be so again. Yet along the way we are gaining more detailed conceptual resources for spelling out why we surround ourselves with objects, and why and how we use them and develop practices and activities including them. The present analysis has highlighted that objects are complex things which can affect us in many different ways in virtue of their material properties as well as of what we take them to refer to. Importantly, objects can have such different effects on us because we are complex historical and enculturated bodily beings with the capacity not only to be directly affected by objects as material things, but also to associate these objects with something beyond themselves.

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4E's Are Too Many
Why Enactive World-Making Does not Need the Extended Mind Thesis

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Abstract 4E's cognition – embodied, embedded, enacted, extended – replaces the cognitivist notion of world-mirroring with an active process of world-making: cognition needs no mental representation and is distributed over body, brain and environment. In recent years, the remark that extended cognition is not enactive and that the embodied approach to cognition fails to provide a definition of body raise the question of whether a postcognitivist approach to experience needs 4E's. This contribution suggests that it does not. The enactive body as a moving sense-making-system informed by phenomenology and pragmatism and its role in the constitution of the distinctive quality of an experience are discussed.

Keywords Non-Duality. Varela. Sense-Making. Enactivism. Embodied Mind.

Summary 1 Introduction. – 2 The Enactive Mind. The Original Proposal and the Extended Mind Thesis . – 3 Extended Reconsidered. – 3.1 Maiese's Criticism . – 3.2 Why Otto's Notebook Can Be an Enactive Extension. 3.3 Appropriation as Enactive Extension. Artifacts Change the Possibilities of Actions. – 4 The Enactive Body in Sensorimotor Life. – 5 Conclusion.

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1 Introduction

What it means to reject the cognitivist, representationalist approach to human experience, why the computationalist approach to the mind is implausible and how the mind is seen within the so called 4E's cognition – embodied, embedded, enacted, extended – shows the recent criticism by Fuchs (2018) to neurophilosopher Thomas Metzinger. In his work *Ecology of the Brain*, Thomas Fuchs strongly criticizes Metzinger's notion of "Ego Tunnel". "We are mental self-models of information-processing bio-systems […]. If we are not computed, we do not exist" remarks Metzinger (1999, 284) in his work with the title *Subjekt und Selbstmodell*. Metzinger's claim is a radical elaboration of the assumption that our experience is an illusion created by the brain. This is considered to be a world simulator. Accordingly, we experience the image of the reality the brain generates without recognizing it as an image. Conscious experience is hence like a tunnel: we look at a show projected in a dark room (Fuchs 2018, 4). From a non-cognitivist point of view, Fuchs strongly criticizes the assumption that the brain is capable of performing its computational tasks without any involvement of a human subject. He rejects such a brain-centred representationalist computationalist approach to the human being and suggests the view that all brain's functions are dependent on the human person's unity as a living organism interacting with the environment. In other words, only if we understand human experience and action as acts of a living being it will become possible to overcome the dualism of brain and mind, of mind and body, the so-called Cartesian dualism. Fuchs concludes that "human persons become at one with themselves not in a mental or neural inner world, but in their bodily and inter-bodily being-in-the-world and acting-in-the-world" (Fuchs 2018, 290). The reductionist understanding of the mind as a disembodied representational system within the skull is hence rejected.

Fuchs' view is grounded in the so-called 4E's cognition. In his criticism and conclusions, the mind is seen as

1. embodied in the living organism. The bodily realization of the cognitive capacities is constitutive of their achievement;
2. embedded in the environmental context the organism co-determines in interactions;
3. enacted or brought forth only by the active perception of the environment the organism co-determines in interaction. Cognition is perceptually guided action;
4. extended beyond the boundaries of the body. The objects of the environment can function as non-neural vehicles for cognitive processes.

The purpose of a 4E's cognitive system is to provide possibilities for embodied actions within the world. The example of Fuchs' criticism

to Metzinger's work will not be discussed further in this contribution. For the purpose of this work, it remains a useful example to illustrate what it means to see cognition and the human mind from the point of view of a 4E's approach. Fuchs does not question the necessity of all four E's to criticize and reject cognitivism and computationalism even if in the last few years a question mark was put on the compatibility of some of the E's of this approach to human cognition with one another. Maiese (2017) questions the compatibility between the enactive and the extended mind. The extended mind thesis proposes that some objects in the external environment can be part of a cognitive process and in that way function as extensions of the mind itself in the environment (Clark, Chalmers 1998). Maiese (2017) points out that theorists who embrace the claim that the mind is fully embodied and enactive cannot consistently also embrace the extended mind thesis because this blurs the distinction between organism and environment, while the enactive and embodied view emphasizes the differentiations between the two.

In the last years, some scholars cast doubt on how the notion of body is defined in embodiment. Manzotti and Chella (2018) remark that it is not clear what body means in the embodied approach to the mind. They criticize the fact that embodiment does not explain the features that should be present in an object to be qualified as a body, focusing only on the body of a subject as though it were something more than a moving physical object. Moreover, the two authors observe that enactivism does not provide any criteria to distinguish between real actions and simple movements unless by reference to subjects. Both criticisms are only partially well-founded. While there are strong grounds to believe that 4E's are too much in the E-approach to cognition – I will show that the extended mind thesis is not needed to overcome the mind-body dualism, which is the main aim of enactive cognitive science – it is not completely true that in the embodied and enactive approach the notion of body is not explained and that criteria to distinguish between actions and movement, which are relevant in order to investigate the subject's activity as an agent interacting with the environment, are missing. They are necessary to explain the enactive tenet according to which perception depends upon "the kinds of experience that come from having a body with various sensorimotor capacities that are themselves embedded in a more encompassing biological, psychological, and cultural context" (Varela, Thompson, Rosch 1991, 172-3). Despite the central role of the sensorimotor capacities of the body in the enactive approach, there is more to enactivism than sensorimotor skills. As Stapleton (2013) remarks, while sensorimotor research in philosophy of cognitive science has often come to be labelled as "enactive" – for example through Alva Noë's use of the term "enactivism" to describe his sensorimotor theory of consciousness – the particular focus of enac-

tive cognitive science lies on the constitution of cognitive systems and the relation between their constitution and their interaction with the environment, which take into account but cannot be reduced to embodied action in perception. The concept of enaction extends beyond sensorimotor skills.

Against this background, the aim of this contribution is twofold. On the one hand, it supports the view that the extended mind thesis is not compatible with the enactive approach to cognition and it does not contribute to overcoming the Cartesian mind-body dualism enactivism criticizes. The extended mind thesis is believed to commit the Cartesian inside-outside fallacy (Aydin 2013). In this contribution, it will be argued that the role of the subject's embodied sense-making in the sensorimotor interaction with the environment provides strong evidence for questioning the compatibility of the extended mind thesis with the enactive mind and for supporting a 3E's approach.

On the other hand, this contribution shows that enactivism does provide both a definition of body I will refer to as the enactive body and a clear distinction between actions and movement, which is necessary to explain what it means that a subject is an agent that evaluates her sense-making processes in the interactions with the environment.

In order to highlight the incompatibility of the extended mind with the enactive mind, a different argument from Maiese's argument will be provided. Instead of focusing on the notion of the extension of the mind into the objects of the environment like Maiese does, the role of the embodied appropriation of the objects of the environment playing a role in embodied sense-making in interaction is considered. I will illustrate the process of appropriation, in which the objects mediating the interaction with the environment become phenomenologically transparent to the subject as the world is experienced through them (Gapenne, Declerk 2009; Lenay, Stewart 2012) and in this sense extend the possibilities of embodied cognition into the experience of active perception. With reference to this, the enactive body and its sensorimotor role in interactions and in the process of the appropriation of an object of the environment will be considered, putting into focus the difference between the role of movement and the role of action. I will argue that the process of appropriation the enactive body as a vehicle of sense-making is involved in makes the extended mind thesis and the functionalism it embraces superfluous in the 4E's cognition. I am not going to suggest that the enactive mind cannot extend like Maiese (2017) does. Rather, I am going to claim that it does extend through embodied sense-making in the process of appropriation of the tools of the environment in the sense that the mind unfolds through them (see also Aydin 2013). I will argue that this process makes the functionalism the extended mind thesis embraces superfluous in a non-cognitivist approach to cognition and experience.

2 The Enactive Mind. The Original Proposal and the Extended Mind Thesis

In their work with the title *Enacting Enaction. A Dialectic between Knowing and Being*, Vörös and Bitbol (2017) remark that in the last years within the field of "enactivism" the far–reaching dimensions of the original proposal of the enactive framework are often simply ignored. The original framework of enactivism is a "conceptual evocation" of "non-duality". It focuses on the ongoing circulation between the flux of lived experience (being) and the search of reason for conceptual invariants (knowing):

> What we take to be objective is what can be turned from individual accounts into a body of regulated knowledge. This body of knowledge is inescapably in part subjective since it depends on individual observation and experience, and partly objective, since it is constrained and regulated by the empirical, natural phenomena. (Varela, Shear 1999, 1)

The notion of enaction was introduced into cognitive science with the purpose of overcoming dichotomies (e.g. mind/body, self/other, self/world), the Cartesian and representationalist view of the human mind and the view of the passive subject perceiving a pre-given world.

> The enactive approach consists of two points: (1) perception consists in perceptually guided action and (2) cognitive structures emerge from the recurrent sensorimotor patterns that enable action to be perceptually guided. (Varela, Thompson, Rosch 1991, 173)

In their work *The Embodied Mind* (Varela, Thompson, Rosch 1991), the authors refer to Merleau-Ponty to reject the relegation of the subject of cognitivism to a passive role of obedience to the environment:

> The organism cannot be compared to a keyboard on which the external stimuli of the world play and in which their proper form would be delineated for the simple reason that the organism contributes to the constitution of that form. (Varela Thompson, Rosch 1991, 173-4)

Perception is hence not simply embedded within the surrounding world. It also contributes to bringing it forth. Perception is embodied action. Without active perception there can be no cognition. In other words,

> enaction is the idea that organisms create their own experience through their actions. Organisms are not passive receivers of in-

> put from the environment, but are actors in the environment such that what they experience is shaped by how they act. (Hutchins 2010, 428)

How can the perceiver guide her actions in a local situation that changes as a result of the perceiver's activity? The reference point for understanding perception is no longer a perceiver-independent world but rather the sensorimotor structure of the perceiver, which determines how a perceiver can act and cognize. Cognition depends upon the kinds of experience that comes from having a body with various sensorimotor capacities. Action and perception are hence inseparable in the exploration of the environment. Määttänen (2015) explains this enactive relation between action and perception, following the pragmatist philosopher Peirce.

> In action "our modification of other things is more prominent than their reaction on us" while in perception "their effect on us is overwhelmingly greater than our effect on them". Precisely because of this difference, action not only broadens the concept of experience but also changes its character. (Määttänen 2015, 21)

In other words, the enactive approach to cognition has the purpose to investigate how the sensorimotor coupling with the environment changes the possibilities of action in interaction. For example, a person who wears skis or snowboards acquires different possibilities for the perception of the environment. This coupling changes the possibilities of actions and hence of embodied cognition and experience of a subject as a skier. A subject – a so called sense-maker or agent – is involved in interactions with her environment in which the objects or events become meaningful for the subject in the process of actively relating to the world by her own exploratory activity and orientation toward a course of action that is adequate to the subject (Di Paolo, Buhrmann, Barandiaran 2017). An actively perceived slope becomes hence meaningful for a sense-maker wearing skis in relation to the opportunity for setting off down the ski run. The sense-maker establishes a perspective on the world and participates in the generation of meaning through her body, bodily mediated perception and action. She enacts a world. The investigation of the possibilities of the embodied and enactive mind embedded in a context of sensorimotor coupling is the main concern of the enactive approach. Sense-making – the enaction of a meaningful world in the interaction of an autonomous system with the environment – becomes a strongly embodied, embedded and enacted sociocultural process which is distributed in the complex socio-technical environment, as Lindblom (2015) remarks. In reading Lindblom's observations one is tempted to explain the mediational role of things, objects and tools in terms of

the extended mind thesis, too. What is it exactly? The extended mind thesis is the fourth E in the 4E's cognition. It proposes that some objects in the external environment can be part of a cognitive process and in that way function as extensions of the mind itself in the environment (Clark, Chalmers 1998). The extended mind thesis asks the question of where the mind stops and the rest of the world begins (Clark, Chalmers 1998; Gallagher 2017). Objects within the environment function as a part of the mind. The vehicles of a cognitive state extend beyond the skin and skull of a cognizing organism. For example, the use of a notebook to support memory is considered to be a cognitive process itself. As Clark and Chalmers put it, "the information in the notebook functions just like the information constituting an ordinary non-occurrent belief; it just happens that this information lies beyond the skin" (1998, 13).

In the following, I will illustrate Maiese's criticism (2017) to the extended mind in enactivism. While I support her view that the extended mind is not compatible with the enactive mind, I do not share her point of view on the reasons for this. I will explain why and develop the view that the enactive mind does extend through the appropriation of the tools that mediates the sense-maker's interaction with her environment. Sensorimotor coupling makes this possible. For this sort of embodied cognitive extension the extended mind thesis has indeed no power of explanation.

3 Extended Reconsidered

3.1 Maiese's Criticism

In order to be able to be compatible with the enactive approach to the human mind, which includes the embodied and the embedded mind, the extended mind should contribute to overcoming the mind-body dualism, the main aim of enactivism. Does the extended mind thesis have explanatory power in this sense? In his contribution on the artifactual mind, Aydin (2013) remarks that the advocates of the extended mind thesis have not sufficiently succeeded in escaping the Cartesian inheritance. According to the author, Clark and Chalmers (1998) preserve an inner-outer dualism by ascribing to cognition an original starting point: cognition arises from an inside world of brain processes. The notion of extended indicates a movement from inside to outside. The content of brain processes is granted an original unextended status. This is parasitical on the idea that cognition can be localized in an isolated inside sphere we can access through introspection. Aydin (2013) refers to Zahavi's criticism to Clark's work and concludes that by upholding the idea of a separate inside brain world Clark does not overcome but rather modernizes the Cartesian

mind-set. These are sufficient reasons to consider the extended mind thesis not compatible with the enactivist anti-dualistic tenets. In her criticism, Maiese does not consider these aspects of the extended mind thesis. Rather, her starting point is the remark that the commitment to the distinction between the organism and the world is the main aim of the enactive approach to the mind. According to Maiese,

> theorists who embrace EE (enactive embodied) cannot consistently also embrace EM (extended mind). This is because once one takes seriously the central tenets of enactivism, it becomes implausible to suppose that either life or affectivity can extend. (Maiese 2017, 346)

According to Maiese, the main tension between the enactive and the extended mind is that the subject as a sense-maker in enactivism is an operationally closed system, spatially situated, and intentionally directed toward the surrounding world. Such considerations indicate that enactivism relies on a clear differentiation between organism and environment. Maiese claims that the idea that a living organism can extend and incorporate non-organic elements of the environment blurs this distinction and is hence not compatible with enactivism. I would like to consider this point here as controversial. Actually, cognition and the mind in enactivism are always relational. They are a way to be in relation to the world (Thompson 2007). According to enactivism, mind and body are not distinct and separable. Cognition arises through the interaction between an acting organism with a body and its environment. The focus is on how brain, body and environment are related when cognition arises. Dynamic relations are the explanatory units of enactive cognition. As Di Paolo, Buhrmann, Barandiaran (2017, 116-17) point out, the system and its environment are coupled. This means that an autonomous system undergoing interactions with the environment remains viable according to the system's structure, which is condition for self-regulation. According to the enactivists, each sense-maker is a dynamical system, it is capable to modify the way its own processes and those of the environment relates. So blurring distinctions in the sense Maiese means would not allow relations to take place. In the following, I will contend that it is the distinction Maiese talks about that makes possible that the objects of the environment can count as extended parts of the enactive cognitive system only if they play a role in the embodied sense-making interactions with the environment. The process of appropriation – rather than the process of extension as described in the original extended mind approach by Clark and Chalmers (1998) – makes possible that the objects of the environment become part of the embodied sense-making interaction of the agent and that a tool of the environment becomes part of the em-

bodied enactive mind and changes the possibilities of the sense-maker's embodied action. In this sense, the enactive mind can extend or expand. Let's consider the example of the improvising saxophone player. In the act of playing, and through interaction with the saxophone, the musician and the saxophone can be understood as coupled, and the musical instrument can be seen as a mediating structure that has become part of the adaptive autonomous organization of a new, higher-order composite system constituted by the musician and her instrument. The saxophone changes the possibilities of action of the sense-maker-player who becomes in the sensorimotor coupling with the saxophone a saxophone player. The distinction between the sense-maker and the environment Maiese (2017) criticizes remains and becomes in this example the distinction between the new form of embodied cognitive system constituted by the saxophone + the sense-maker = the saxophone player and the environment. In this example cognition does extend enactively. Nevertheless, Maiese is right in acknowledging the lack of explanatory power of the extended mind thesis in enactivism. But not for the reasons she supports.

3.2 Why Otto's Notebook Can Be an Enactive Extension

As Gallagher (2017) remarks, in contrast to enactivism, the extended mind thesis embraces functionalism. Since mental states are identified by a functional role, they are said to be realized on multiple levels; in other words, they are able to be manifested in various systems, so long as the system performs the appropriate functions. For example, the use of a notebook to support memory is considered to be a cognitive process itself. Can this be considered to be enactive? The well-known example of Otto and his notebook helps give an answer. Otto, the Alzheimer's patient who uses a notebook as memory, interacts with his notebook to find information he can't remember otherwise. Otto must read it and write in it. This requires perception and action. Ward and Stapleton (2012) remark that if this means thinking of Otto's perception being directed upon information in the notebook, which then informs cognition, the extended mind thesis is not compatible with the enactive approach because it seems to support a discontinuity between action, perception and cognition. But if Otto's notebook – the external artefact – serves to structure Otto's cognition and his perception of the notebook moves to the background of his experience, which will be directed upon a range of situations and possibilities the shape of which is constrained by his skilful interactions with the notebook, the enactivists will consider the notebook as part of the cognitive system through which Otto's mind is directed upon the world. This process is called transparency in phenomenology. I will come back to transparency later on in this contribution.

While Ward and Stapleton (2012) highlight the fact that cognitive extension into the objects of the environment is possible for enactivists only when or if it is subordinated to transparency, Wheeler (2019) supports the view that the fact that technology in use disappears from the conscious apprehension of the user is a necessary condition for technology to provide us a case of extended mind. In his work, he does not consider the enactive approach to human experience in relation with extended cognition. Rather, he considers the difference between extended cognition and embedded cognition in the use of technological devices. Let's have a look at his example of the mobile phone. According to Wheeler, we have a case of embedded cognition if the mobile phone is a scaffold that enables you to fluidly and reliably access phone numbers that are not stored in your memory, then losing it might well be disruptive but your mental machinery would still be intact. It becomes a case of extended cognition if the mobile phone is a genuine constituent of your mental machinery and the material realizers of your cognitive states and processes. If you lose it you lose part of your cognition. In this second example it would be transparent to your consciousness. What Wheeler calls 'extended' is what is closer to what in the following I will characterize as enactive, although Wheeler seems to make extended cognitive processes dependent on the technological devices without considering how such devices change the possibilities of action and perception thanks to transparency. As I will show, this point makes the difference between the enactive and the extended mind.

In contrast to Wheeler, Slors (2020) highlights the role of functionalism in the extended mind thesis by Clark and Chalmers (1998). The idea that some of the cognitive work in our interactions with the world has to be performed by items external to our brains and bodies can be unpacked following the basic idea behind functionalism that functional role states and processes are multiply realizable: the same function can be physically realized in different ways. The example of Otto and Inga explains this. Inga wants to visit the MoMa in New York and remembers that it is on 11 West 53rd Street. Otto has early onset Alzheimer. Instead of relying on information storage in his head, he uses a notebook he always carries with him. When he wants to visit the MoMa he consults his notebook to find the address. The same functional process has in this example two different implementations, one involving brain processes only, the other involving an item in the external world as well. Implementation extension is the idea that the realization or implementation base of functional role states and processes that are characteristic of human cognition includes items outside the brains and bodies of persons. According to the author, implementation extension fits really well with artifact extension, since physical artifacts are easy to imagine to be causally coupled with brains and bodies in ways that extend the implemen-

tation base of functional processes. Auvray and Myin (2009) refer to the notebook and the function the notebook has in Otto's case as METs – Mind Enhancing Tools. These are devices that should not be understood as merely external stand-ins for already existing internal processes. As they provide novel forms of interaction with the environment that cannot be reduced to perception in one of the natural senses, they provide an extension of cognition that would not be possible without them. More precisely, METs can be interpreted in two different ways. According to a first interpretation, the role of METs is mainly to make it easier to perform in an externally supported way cognitive operations that are normally performed exclusively by relying on unenhanced resources. METs would then contribute to cognition in a quantitative rather than in a qualitative fashion. They would support cognitive functioning, not by making novel operations possible, but by facilitating the already available cognitive operations. According to this view, the use of external tools cannot genuinely transform cognition. This interpretation of METs flows from a conception of cognition according to which everything properly called 'mental' and by extension 'cognitive' is internal to the brain or to the body. This is exactly the inside-outside fallacy Aydin (2013) refers to when he remarks that the extended mind thesis preserves the Cartesian dualism I mentioned above.

A second interpretation of METs has been proposed according to which METs do transform cognition in a qualitative way. Novel tools not only facilitate established cognitive processes; they can also allow for the appearance of novel cognitive operations, which simply would have been impossible without them. For example, without the proper means and tools to write down, calculate, or draw diagrams, human cognitive abilities would not have evolved to their current state. This second interpretation is closer to the enactive approach to human mind and experience in the interaction with the environment and its tools. In the enactive approach cognition is a process that encompasses perception, action and bits of the world. Extending a cognitive process in this sense is not extending a realization base of a functional role (because there is no such thing according to enactivists), it is extending the part of the world we can engage with, as Slors (2020) remarks. Extending the impact of engagements can be achieved by involving specific artifacts in the interaction. In other words, it is increasing the impact that a cognitive engagement with the world has, for example on the further action possibilities offered by the environment to the acting organism. Against this background, we can say that the enactive mind is not extended by objects of the environment but unfolds through them. In the following I will show that the process of appropriation makes enactive extension possible and the extended mind thesis superfluous in a non-cognitivist approach to cognition.

3.3 Appropriation as Enactive Extension. Artifacts Change the Possibilities of Actions

In enactive terms, technologically mediated interactions are actions mediated by a technical device that changes the agent's possibilities of action in the perception of the environment the agent enacts and interacts with (Lenay, Stewart 2012). Perception – and hence experience and cognition – comes into being thanks to the agent's sensorimotor coupling with the technologically mediated environment. Technologically mediated interactions require the agent's sensorimotor skills in order to perform the actions needed for perception and cognition. Gapenne and Declerck (2009) explain this in the field of sensory substitution devices they contributed to developing, working on the improvement of the Tactos platform. This is a perceptual supplementation technology which defines an environment for the haptic reading of shapes. How does it work? The subject moves a stylus on a graphic tablet, which controls the movement of a cursor in the digital space. This cursor represents the surface of a 'sensory captor' which can have various shapes. When the receptor field of this sensory surface crosses a black pixel in the digital space, it triggers the activation of a tactile stimulation by an electronic Braille cell. In this setup, the perception of an object as a whole requires an active exploration of the object. Gapenne and Declerck (2009) observe that the dynamics of the appropriation of an instrument involves two mechanisms: on the one hand the incorporation of the instrument as such, its integration into the body schema (the term pertains to motor control); on the other hand the re-organisation of the ambient world, which is perceived in reference to the possibilities for action the instrument makes possible. The disappearance of the instrument from the user's field of focal attention, and the user's feeling of an immersive non-mediated presence in the world are the result. "It is precisely when the world is envisaged in terms of the operations made possible by using the instrument that the latter is no longer perceived for itself", they write (Gapenne, Declerck 2009, 368). An easier example is the situation in which I use my glasses to see with. When I put my glasses on, I no longer see the glasses themselves. In the case of appropriating a new tool, the user has to deal with a renewal, constrained by the tool, of his exploratory mode with respect to that environment. In other words, the process of appropriation calls on the user to replay the whole process of constituting an experience of environmental events (see also Lenay, Stewart 2012).

The notion of transparency can be traced back both to Heidegger and to Merleau-Ponty. In *Being and Time*, Heidegger ([1927] 1962) argues that we ordinarily encounter entities as equipment, that is, as being for certain sorts of tasks (cooking, hair-care, text-editing, navigation, and so on). According to Heidegger, when we skilfully

manipulate equipment in a hitch-free manner, we have no conscious apprehension of the items of equipment in use as independent objects. Thus, to use Heidegger's most-quoted example, while engaged in trouble- free hammering, the skilled carpenter has no conscious recognition of the hammer, the nails, or the work-bench, in the way that one would if one stood back and thought about them. In other words, tools-in-use become phenomenologically transparent. All we experience is the ongoing task, e.g. the hammering. Merleau-Ponty, on the other side, observes that there is also a perceptual dimension to some cases of tool use. For example, a blind person using her cane in a skilled and hitch-free manner does not consciously apprehend the cane itself. On a first impression, it might seem that this is simply another case of transparency in action: the blind person uses the cane for finding her way around, and when she does so in an expert, smooth, and undisturbed fashion, the cane disappears from conscious apprehension. However, the cane is also a device that enables the blind person to access the world. We can say that in this sense cognition or embodied sense-making extends into the cane to widen the range of the possibilities of the exploration of the environment. Does the blind person with a cane in her hand become a new form of life in enactive terms? I tend to say yes. The appropriated cane changes the possibilities of embodied actions and hence of perception of the sense-maker like Otto's notebook when it disappears in the background of experience. A new form of cognition comes into being. Extending a cognitive process is extending the part of the world the blind person can engage with. Against this background, it seems to be plausible to support the view that transparency and the process of appropriation the enactive body is involved in make the extended mind thesis superfluous in 4E's cognition.

In the following section, the role of the enactive body in the sensorimotor interactions with the environment will be discussed.

4 The Enactive Body in Sensorimotor Life

Understanding what the body in enactive cognitive science is becomes central in order to put into focus how it can bring forth cognition in active perception or perceptually guided actions. From the point of view of the enactivists, cognition does not need mental representations and is hence direct and embodied. As it was said above, this means that it depends upon the kinds of experience that comes from having a body with various sensorimotor capacities. So, what exactly is the enactive body? Despite the criticism by Manzotti and Chella (2018), Di Paolo and Thompson (2015) provide an answer. The enactive body is a self-individuating system, an adaptively autonomous and therefore sense-making system, a moving constitutively

sensorimotor system having access to the environment. Adaptivity and sense-making are the two central mechanisms that determine the enactive body. Adaptivity is the subject's capacity to regulate herself with respect to the boundaries of her own structure and identity in the mutual and continuous exchanges with the environment. Adaptive processes permit the meaningful distinction of events that do not put the subject's organism directly in any danger. Adaptation has the function to preserve the subject's biological structure and identity and corresponds to the subject's own particular way of realizing and regulating autopoiesis, the organizational logic of living systems, according to which their ongoing processes of material exchanges with the world relate to each other in such a way that the same organization is constantly regenerated by the activities of the processes themselves (Scarinzi 2012; Johnson 2017; Di Paolo, Buhrmann, Barandiaran 2017).

The subject's embodied evaluation of the consequences of her interaction with the environment for the conservation of her identity is possible thanks to bodily sense-making. The core idea of bodily sense-making is that the whole organism is a vehicle of meaning which is dynamically constructed by the subject having a perspective on the world. In the interaction with and adaptation to the environment, bodily sense-making is the evaluation of an adaptation and takes place in the organism's coupling with the environment. It has both the function to contribute to maintaining the organismic integrity of the subject (regulation) and to expand the subject's cognitive domain through the active selection of viable environmental factors to be integrated into the subject's cognitive domain (Scarinzi 2012) – the viable world each agent selects from the environment according to her autonomous mode of coupling. Maiese's criticism can be rejected also from this point of view. It is true that the subject and the environment are two separated and distinguished entities and that the enactive embodied subject is committed to the conservation of her identity, but in the sensorimotor exploration of the environment the subject-sense-maker is capable to expand her cognitive domain by integrating factors of the environment according to her viability and creating her own experience through her actions. A skier or a saxophone player can be seen as the result of the unfolding of embodied cognition in the expanded viable cognitive domain of a sense-maker through the coupling with skis or with a saxophone.

The enactive body as a sense-making system can be described also in phenomenological terms as the relation between the lived and the living body, as Fuchs (2018) shows. The lived body (the inner) is the dynamic condition and the performance of the living body in the interaction with the environment (the outer) in a relation of co-determination. It is a backdrop of the actions of the subject's living body. One's own body shows itself to be a material thing animated

from within by sensation and motility (Fuchs 2018). In other words, our enactive body allows the life we live while we are engaged in doing things, in appreciating our environment, in organizing our activities. This is our sensorimotor life – "the ongoing bustle of animate embodied being" (Di Paolo, Buhrmann, Barandiaran 2017). The enactive body is characterized by three dimensions of embodiment: 1) the organismic regulation of the entire body; 2) sensorimotor coupling between organism and environment (sensorimotor life); 3) intersubjective interaction that involves the recognition of the intentional meaning of actions and linguistic communication. Each perceptual experience is a way of acting, constituted in part by the perceiver's skilful mastery of the relation between sensory experience and movement (Scarinzi 2012). In order to understand this way of acting, the difference between moving and acting is necessary and it is provided by the enactive community. In the following, the criticism by Manzotti and Chella (2018) that enactivism does not provide a definition of movement and action can be rejected.

Di Paolo, Buhrmann and Barandiaran (2017) point out that a movement is simply a teleological change of position with the purpose of exploring the environment a system interacts with. For example, sounds get louder as you move towards their source but stay constant in volume when you travel at a fixed distance around them. In the enactive approach, movement has also the role to make possible the cognitive-emotional evaluation of a situation (Scarinzi 2014). More precisely, the notion of bodiliness and grabbiness (O'Regan 2011) helps understand the enactive role of movement in bringing forth the emotional evaluation of sense-making. Bodiliness expresses the dependence between body motion and sensory input in a sensory modality. When you move your body, incoming sensory information immediately changes. Grabbiness is the capacity of a sensory modality of grabbing our cognitive processing. It is the capacity of something to attract one's attention (O'Regan 2011), to grab it away from what you were doing. As it is argued in Scarinzi (2014), the former is grounded in the motor lived body, an implicit I can and do move in this and that way. The latter is grounded in the cognitive-emotional lived body, in the subjective experience of the evaluation of the aroused subjective cognitive-emotional lived body. The feel of the emotion 'fear', for example, emerges from the sensorimotor coupling of the subject with the environment determined by bodiliness and grabbiness grounded in the motor and cognitive-emotional lived body, which as a backdrop of the actions of the subject's living body in the environment co-determines the subject's sense-making of the fear-provoking situation she interacts with. In this case, movement is constitutive of the feel of an emotion (Scarinzi 2014). A combination of movements that has some effects on or changes the environment we interact with is an action and is activity-dependent. In other words, actions allow an agent

to act on and change the affordances of an environment. For example, falling a tree or traversing a complicated terrain or picking up a cup of hot tea and putting it to the lips are actions. Sensorimotor life is possible because every sense-maker is an agent that needs a rich environment to unfold and make sense of her possibilities of actions through active perception. In O'Regan's words:

> the agent will have to be situated in a context which is sufficiently rich for it to make sense to say that there are a variety of behaviors which the agent can choose from and a variety of situations that it can be cognitively accessing. (2011, 90)

Against this background, the criticism by Manzotti and Chella (2018) that enactivism does not provide a definition of body and do not explain what a movement and what an action is, can be considered to be implausible.

5 Conclusion

Are 4E's too much in the anti-Cartesian approach to cognition? This contribution argues that a non-cognitivist approach to human cognition and experience that aims at overcoming the mind-body dualism is not compatible with the extended mind thesis by Clark and Chalmers (1998). The extended mind thesis preserves an inner-outer dualism by ascribing to cognition an original starting point: cognition arises from an inside world of brain processes. This is not compatible with the anti-Cartesian enactivist approach to the mind which is always relational. Maiese's criticism was discussed. She considers that the enactive mind cannot extend because the idea that a living organism can extend and incorporate non-organic elements of the environment blurs the distinction between organism and environment the enactive approach is committed to. It was shown that in the enactive approach this distinction is necessary for relational cognition to take place and for the appropriation of the tools allowing cognition to unfold in the environment. It was argued that it is the distinction Maiese refers to that makes possible that the objects of the environment can count as extended parts of the cognitive system in sensorimotor coupling. The enactive mind does extend in the sense that embodied cognition unfolds through the objects of the environment that expand the subject's possibilities of embodied action and hence of perception and engagement with the environment. Enactively extending a cognitive process is extending the part of the world the sense-maker can engage with and her enactive body is involved in. This can be achieved by involving specific artefacts in the interaction that serve to structure the sense-maker's perceptually guided cogni-

tion constrained by her skilful interactions with the specific artefact.

Against this background, this contribution supports the view that appropriation and transparency the enactive body is involved in make cognition extension possible and the extended mind thesis superfluous in 4E's cognition. By moving back to 3E's, the anti-Cartesian approach to cognition would escape the Cartesian inheritance of inner-outer dualism the extended mind thesis still conveys.

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