

Alex B. Pablos

# Deleuze on Habit: Cognitive Science Beyond Prediction

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Institute of Cognitive Science

Master Thesis

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**Deleuze on Habit:  
Cognitive Science Beyond Prediction**

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by

Alex B. Pablos

February, 2024

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# 1. Introduction

One of the fundamental reasons for the existence of such a thing as philosophy of science stems from the fact that in scientific work the intertwining of the descriptive task and an implicit normativity is always unavoidable, even if only in a small loophole. Attempting to refine this intertwining leads to influential debates about how theories are grounded, how effective their methods are, how reliable their data are, what the goals of research are, what the important questions are, how scientific organisation evolves, what is meant by progress in knowledge, and a long list of practical and epistemological issues that ultimately condition each other (Laudan, 1986). Indeed, observing, experimenting, conceptualising and explaining are activities that are linked to our limitations as human beings. Therefore, we assume that these activities seem to always need to be supported by something that grounds and secures them, such as, for example, one or another abstract formalisation or alluding to the intersubjective consensus<sup>1</sup>. In this sense, what any implicit normativity does is the following: while it weighs how relevant for a theory is to be correct, good, beautiful, useful or organised, it also determines what should be understood by “correct”, “good”, “beautiful”, “useful”, “organised”, etc. This is *normativity*; something that seems to be inescapable.

That said, I understand that this double-edged nature of any research, that is, its descriptive as well as normative capacity, must also be present in cognitive sciences. In this sense, and if like me, you think that cognitive science is at one of the epicentres of current science (for their curiosity about the phenomenon and functioning of cognition not only encompasses questions about the cognitive organism and subjectivity stirring up the whole epistemological tradition in philosophy, but also their advances directly engage sciences from biology to cutting-edge cybernetics; (and heck, even economists and politics rely on some theory or other about the subject!), therefore, I claim, being attentive to the descriptive-normative imbrication of the theories of the cognitive sciences is crucial.

Thus, the importance of cognitive science is one of my presuppositions. But, in addition, another of my starting points, supported by extensive research, is the importance within this field of study of the theories that fall within the framework of what is known as *post-cognitivism* (as a general framework or paradigm), as *4E of cognition*<sup>2</sup> (as, the most fruitful interdisciplinary research programme within this paradigm), or, as it is more commonly known, *embodied*

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<sup>1</sup> For example, see the work of logicians and positivists such as Carnap, Popper or Albert for the former, and Adorno, Habermas, Apel or the Erlangen School for the latter.

<sup>2</sup> See Newen et al., *The Oxford handbook of 4E cognition* (2018).

*cognition*<sup>3</sup>. Regardless of the name, all of them allude to a new framework of research on cognition that moves away from considering cognition as an abstract information processing system mainly located in a central processing unit, as *cognitivism* proposed. Instead, they focus on the idea that the cognitive abilities of the organism depend on the capacities of the body itself, on the dispositions of its environment and on the history of these interactions.

Like many, I believe I understand its contributions as an epistemological revolution, whose theory is dissipating from cognitive science to other philosophical areas because of its relational, anti-essentialist and anti-mentalist conception of the subject and because of the empirical results it is obtaining. Although post-cognitivism is becoming more prolific today, this paradigm finds affinity with other important currents that emerged at the same time, in the 1970s-90s, such as *constructivism* or *emergentism*, or *structuralism and post-analytical philosophy* in general. Moreover, fundamental similarities are found with some contemporary approaches such as biopsychosocial and structuralist approaches in social sciences and health sciences, or for *relationism*, *agentialism*, *object-oriented ontology* and even *accelerationism*, in philosophical currents.

However, the relevance and evidence of post-cognitivism should not blind us to its normativity. Therefore, in this thesis I am going to examine part of its implicit normativity, concretely, accessing through the study of its theories. But to say that I will deal with theories is too general and, for me, unwieldy. Thus, in order to present the core of the present thesis, I cannot find a more faithful way than to explain how I arrived at this issue.

For, mainly, what this text is about arises from a double concern. On the one hand, there is the general concern for the aforementioned normative dimension of all theories. And I think that this can be studied with the help of a theoretical and historical-philosophical exercise, that is, by observing how some ideas and not others accompany this paradigm in its theoretical and practical motivations.

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<sup>3</sup> However, here I must open a preliminary parentheses to clarify the use of this terminology in this thesis. On the one hand, "embodied cognition" only refers to one of the four E's of "4E cognition" (embodied, embedded, enacted, extended), although it is possibly the most widespread way of referring to the paradigm in question, both in its reference from other sciences and from philosophy, as well as in its popular use. As an example of this, "embodied cognition" is the only one of the three that has an entry in the *Stanford Encyclopedia of Philosophy* and it is the one that contains the most extensive entry in *Wikipedia*. On the other hand, we could say that 4E is in turn subsumed in a broader *paradigm* which would be *post-cognitivism*, since absolutely all strands of 4E are considered as such. However, despite the fact that post-cognitivism is the closest concept to being considered a paradigm, within it there is a confusion of theories that are not as demarcated as in 4E, which encompasses these, together with mentions of phenomenology, *ecological psychology*, the theory of *cognitive niches*, or approaches based on the theory of dynamic systems or the *predictive mind*. Anyways, in some moments I will be interested in focusing on the *4E of cognition*, since it can be said that it is the most fruitful, detailed and refined *research programme*. All in all, in saying this, I have wanted to make explicit reference to what Kuhn (1962) understands by paradigm and what Lakatos (1970) understands by research programme; concepts that I understand as complementary.

A drift that, with respect to the cognitive sciences, I will consider from its beginnings until today, in the year 2024. It is in the midst of this almost doxographical curiosity that I am particularly struck by the implicit but central concept of *habit* in all these post-cognitive variants<sup>4</sup>. My interest in the descriptive-normative question invites me to investigate the use of this concept. Indeed, the meanings of habit will be the road of the present thesis. A concept which, of special relevance for the post-cognitivist strands, was crucial in the philosophy of the nineteenth and early twentieth centuries. This on the one hand.

But in parallel to the analysis of the normativity in the concept of habit, during my years of study in cognitive sciences, it appears my interest in the ideas of Gilles Deleuze and those that he develops together with Félix Guattari, without this author necessarily appearing closely linked to the subjects dealt with in cognitive sciences. In fact, this author was never mentioned during my lessons. However, I believe that so many connections exist between Deleuze's ideas and post-cognitivism. In fact, it does not seem pretentious to me to affirm that he is largely absent in the main sources of post-cognitivism.

Deleuze's work not only has repercussions in cultural-political theory, but, with the same intensity, Deleuze tried to expose, to put it quickly and crudely, a philosophy based on a strong critique of the Platonic and Cartesian epistemology of representation, as well as a rejection of the Hegelian's ontology, based on the primacy of equilibrium and generalisation over disruptions and differences. For many, Deleuze is known because of his philosophy of affect and micro-politics. But in Deleuze there is also a project in which information theory and biology converge linked to *dynamical systems theory*<sup>5</sup>. Indeed, in Deleuze we find a pragmatist theory of the subject explicitly anti-Cartesian as early as his text on Hume or Spinoza.

But over all, what is of most interest to me here is that in Deleuze we find a particular theory of habit. Indeed, in *Difference and Repetition* there is a particular conception of *Habitus* that lies at the basis of his philosophy. It is a theory, too, on the margins of the history of the philosophy of mind, which has generally struggled between a North American pragmatism and a German phenomenology. Deleuze's approach draws as much from naturalist, Darwinist and pragmatist influences as it does notoriously from the French spiritualist and vitalist tradition, in which, among others, we find F. Ravaisson, M. de Biran and H. Bergson, as well as J. Monod, G. Bateson and G. Simondon or even A. Artaud.

Well, I have said that Deleuze was an author with very little presence in my academic training in cognitive sciences. But this is not entirely true. The cognitive philosophers Jan Slaby and Rainer Mühlhoff once explicitly operated

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<sup>4</sup> Notably, in the course of the work, I came across works such as Legg & Reynolds (2022), which, pointing in the same direction, have been of great support to me.

<sup>5</sup> See mainly the work of DeLanda (2002) *Intensive science and virtual philosophy*.



with concepts from Deleuze and Guattari.<sup>6</sup> In addition, Ezequiel Di Paolo (2016, 2021) published another series of research in which enactivism integrates ideas of Piaget and Simondon, who, as I have said, is one of Deleuze's major influences. However, I dare say that these studies have only deepened in the direction of the study of cooperation between subjects and the creation of collective structures of meaning, which are not exactly the interpretation of the mechanism of habit that will be proposed here.

So, the fact that at the core of Deleuze's philosophy is an explanation of habits allows for a very direct and interesting dialogue with the rest of the post-cognitivist proposals. Importantly, it is not only (as will be shown) that the concept of habit is crucial to post-cognitivism, but that many recent authors (Bruineberg, Chemero, Di Paolo, Friston, Heras-Escribano, Kiverstein, Rietveld, among many others) are introducing in 4E/post-cognitivism the theory of dynamical systems in order to deal with this topic, exactly as Deleuze anticipates but from another perspective. Therefore, what will be most interesting, will be to see how *Deleuze's theory can give rise to a completely different normativity to the study of cognition and, in particular, to the concept of habit that is permeating post-cognitivism both in its philosophical theories and in its computational developments on artificial cognitive systems.*

In short, this thesis will try to introduce Deleuze's concept of habit to the cognitive sciences. In the thesis will appear the affinities of Deleuze's ideas with enactivism, extendedness, enculturation, the brain-body continuum, as well as with the theory of dynamic systems and the ecological psychology's concept of *affordances*, among others. But we will also observe differences that concern not the validity of the research or theories in post-cognitivism, but its given *interpretation* that I believe guides its normativity. We will see that this deals with post-cognitivist implicit tenets such as adaptationism as an exclusive Darwinian interpretation, the tendency to equilibrium, or the focus on harmonical or task-relevant engagements; closely to what Deleuze treats as a vice of the "dialectics of identity".

In this sense, I advance that the central concept of this text is not so much that of habit as it is the notion of *habit=prediction* sustained by post-cognitivism. Indeed, and as I will develop, the equating of habit with attunement and prediction implies that certain discrepancies or nuances between Deleuze and post-cognitivism come to light.

However, in no way should this thesis be understood as a rejection of post-cognitivism. Firstly, because as I have said above, I neither believe nor can I question much of what this paradigm has to offer. I don't even think I want to question some of its assumptions. Secondly, because even assuming Deleuze's conception of habit, it would be more critical of some authors of this paradigm

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<sup>6</sup> I am talking specifically about the papers "Affective resonance and social interaction" (Mühlhoff, 2015) and "Affective Arrangements" (Slaby, Mühlhoff & Wüschner, 2019).

than others, so that to generalise the critique would be excessively presumptuous. But, thirdly, because, although there will be a critique of certain theoretical tenets, I conceive Deleuze's ideas as a proposal that serves to complement and re-evaluate the normativity of post-cognitivism. In this sense, it is an attempt to show how different normativities can be brought to bear within an already organised research programme.

So, I see Deleuze as a support with which to expand the paradigm and be alert to the practical consequences of its implicit normativity. In this sense, I will take those lessons of François Laruelle about *non-philosophy* (1996). Philosophy is adept at recognising, schematizing and even forcing theories to create dyads or polarisations, which the "great theorist" then seeks to overcome and reconcile by providing more or less rigorous arguments and concepts. Non-philosophy does not seek to polarise anything, let alone offer *the* reconciling solution. Following this, I will use Deleuze's philosophy to propose complementary paths in the study of cognition. Specifically, I will try to affect post-cognitivism by showing that Deleuze, from the margins of the history of cognitive science, speaks about marginal cognitive phenomena that constitute us but escape the expected functional and organisational schemes.

To deal with all of this, the present work will be structured in three main chapters exposing three thesis that analyse the concept of habit and post-cognitivism. First, in chapter 2, I will contextualise post-cognitivism, taking as a starting point the 4E research program in order to seek a definition of the paradigm. I will contextualise it synchronically and diachronically, that is, in a first subsection I will observe it at the current moment, seeing if its discrepancies allow us to obtain such a definition. In a second subsection, I will analyse its genealogy and its trajectory. The latter subsection characterises the anti-computational motivation of its genesis, which is influenced mainly by phenomenology and North-American pragmatism. I will deal with the context of the cognitive sciences from an archeology of the vicissitudes of the concept of habit. Thus, we will see the shift of reflection in the cognitive sciences, particularly of cybernetics and philosophy of mind, towards concepts related to naturalism, dynamic connections and situated experiences. Here we will start to glance at some of its normativity. But the most important thesis obtained out of both contextualization is that post-cognitivism should be defined by holding *a habit-centred epistemology*. In other words, stating that post-cognitivism relies on a habit-centred epistemology means that, according to post-cognitivism, it is essential for the individual to acquire knowledge through habitual actions. Additionally, what is considered knowledge is essentially what can be facilitated or accessed through these habits.

Since a philosophy of habit is deduced as central for post-cognitivism, I will explain the relevant role that this concept plays in their theoretical scaffolding. This is the focus of chapter 3. Here, I will try to disentangle what presuppositions underpin its notions of habits in order to arrive at a deeper

definition of post-cognitivism. To do this, I will analyse a large part of its referent authors. We will see the naturalistic, evolutionary, pragmatist and situated perspective intersects with an all-encompassing importance of an *epistemology of attunement* (3.1) and an *epistemology of prediction* (3.2) for cognition. This analysis allows me to claim a second thesis, namely, the presence of the equation *habit=prediction* in today's cognitive sciences. When considering these philosophical assumptions of post-cognitivism, the strong incidence of proposals that are understood under the idea of the *predictive mind* and the *free-energy principle* will also appear. Paradoxically, it seems that the development of post-cognitivism ends up leading to a computational conception of the human being, which, although anti-mentalist, is not so clearly anti-representational or anti-internalist. *This seems mainly because at the core of them we can find a habit conceived opposed to goal-oriented cognitive faculties.*

After this, I move on to Deleuze. Chapter 4, exposes Deleuze's conception of habit, where habit is only *partially* linked to prediction and attunement. We will see a habit completely at odds with a mechanised or rigid behaviour. Thus, the third thesis is that Deleuze works against *the habit-goal dualism* which, as I will argue, is present in the background of much of post-cognitivism both in its philosophers and in its technological developments, as shown by current AI. With all this, the normativity implicit in Deleuze's concept of habit does not speak of equilibriums, adjustments, anticipations and corrections, but habits promote the growth of diversity, cranky arrangements and the proliferation of thoughts and behaviours situated on the margins of repressing labels. To add on this, I will put Deleuze in dialogue with some post-cognitivist authors who have most resisted equating habit to a mechanical and inflexible element opposed to creative tasks.

## 2. Situating Post-cognitivism: Anti-computationalism, Phenomenology and Pragmatism

Many have already excellently set out the set of theories that aim to dismantle the Cartesian mind-body dualism<sup>7</sup>. Instead, these theories have shown how mind and body are co-involved in a larger dynamic where action and perception are inseparable and where emotions, environmental dispositions and socio-cultural conventions play a constitutive role in the organism. As said in the introduction, these theories now appear to us under various titles such as "post-cognitivism", "embodied cognition", or as the research programme of "*4E of cognition*"<sup>8</sup>.

However, the central issue of this thesis is to analyse the normativity of post-cognitivism. In order to do this, the first step is to try to define the traits of this paradigm. This is the subject of this chapter. Specifically, I will carry out a synchronic contextualisation summarising its current debates (§2.1) and a diachronic contextualisation as an attempt to a more genealogical analysis (§2.2). It will be shown that the concept of habit is crucial for the history and the present of post-cognitivism.

### 2.1. The Present (in)Definition of Post-cognitivism

The post-cognitivist paradigm contains its own internal debates. But a minimal definition of post-cognitivism is that it conceives that the cognitive abilities of an organism depend on its body, its environment and the history of these interactions. Thus, cognition is not, as traditional cognitivism claims, mainly dependent on an abstract information processing system located in the brain (or some other processing unit, as the CPU in artificial systems).

Post-cognitivism can be said to encompass the 4E research programme and other theories that do not use the same nomenclature, such as dynamicism in computational theory, dynamical systems theory, ecological psychology and neurophenomenology. Even so, it happens that post-cognitivist theories that are outside the explicit appeal to the 4E, have been developments that either the 4E research programme has already taken into consideration, or have arisen later or simultaneously from particular contributions of an author included in the programme. Therefore, I understand that from the 4E I can reach all the points of the post-cognitivist debate.

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<sup>7</sup> See *The Oxford Handbook of 4E Cognition*, *The Cambridge Handbook of Situated Cognition* or see the books in the Palgrave Macmillan book series, *New Directions in Philosophy and Cognitive Science*.

<sup>8</sup> See note 3.

The "4E's" were so called because they originally twinned four key assumptions about cognition: being *embodied*, *embedded*, *extended* and *enactive* (Rowland, 2010)<sup>9</sup>. As a reminder, "embodied" means that cognition involves the whole body, not just the brain and neuronal cells. This also calls into question the traditional concept of "mental representation" because cognitive processes imply the body's morphology as well as its movements, thus, cognition is more than the processing of abstract or logical units of information. "Embedded" means that the cognitive agent is embedded in a material and cultural context, thus, it is never isolated. "Extended" implies that the agent incorporates or is constituted by natural or artificial elements, whether material or symbolical, which make certain cognitive capacities possible. Finally, "enactive" means that the agent endows the environment with meaning and is endowed with meaning in an active process in which the agent and the environment are co-define.

These four characteristics of cognition developed, and continue to do so, as research frameworks of their own, the central and common point being that cognition "was not limited to processes in the head" (Newen, et. al., 2018, p. 4). Such a conception has given rise to what Sven Walter has considered a shift of the central question in the philosophy of mind from the question of "what is cognition" to that of "where does cognition happen" (Walter, 2014, p. 241). Within, one of the elements in dispute has to do with the adequacy, feasibility or usefulness of some of the "E"s in order to be able to pinpoint that "where". In fact, behind the "where-question" it follows the fundamental question of what are the limits of cognition, therefore, who or what is exercising this cognition. Thus, while their research continues to develop, there is also a movement of criticism or screening within the programme as behind the different positions encompassed in the 4E there are different ontological conceptions about what is considered a cognitive agent. This adds difficulties to define post-cognitivism.

### **(Difficulty 1) The Constitution Problem**

A well-known example of these disputes is about whether it is relevant to defend *embeddedness* and *extendedness* as separate investigation lines or whether it is possible that either could be refined to subsume the other (Sterelny, 2010; Sutton et al., 2010; Stephan 2018). While the advocates of embeddedness are clear that there is a main cognitive subject despite being inscribed in its ecology (Barsalou, 1982; Zwaan, 2014). On the contrary, proponents of extendedness, distribute the agent through the elements necessary for completing its cognitive tasks, therefore, contributing to dilute the contour of cognition (Clark & Chalmers, 1998; Clark, 2008). For many this dispute is not just a matter of theoretical economy (or "Ockham's razor"), but that in it lies one of the keys to defining the boundaries of the cognitive subject. More precisely, this dispute is traversed by what in philosophy of science is known as *causality-constitution fallacy* and which is mainly incurred by the defenders of extendedness (Adams & Aizawa,

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<sup>9</sup> In Rowland's book, the origin of the concept is attributed to Gallagher, who first used it at a conference on 4E cognition at the University of Central Florida in 2007.

2008), but also by those of enactivism (Aizawa, 2014). The causality-constitution fallacy refers to the fact of explanatorily confusing a causal relationship (in this case the causal role of the extracranial, i.e. the environmental and the bodily, in participating in cognitive processes) with a constitutive relationship (in which the extracranial is part of the cognitive process itself).

Different solutions are given to this problem. Some authors claim that in order to solve the problem of constitution it is necessary to move away from both a synchronic and static perspective and one that understands constitution in exclusively materialist terms (Kirchhoff, 2015; Gallagher, 2017; Newen, 2018). For these, the key is to understand systems by including the notion of process, and thus understanding them *diachronically* and *dynamically*. Assuming the diachronic form means that the concepts of causality and constitution are not independent and opposed: "the constituent elements may very well be in complex, reciprocal causal relations with each other, but just these reciprocal causal relations make the mental process what it is" (Gallagher, 2017, p. 10). Thus, it makes less sense to ask whether cognition is distributed in defined entities (a question that arises from assuming that the brain is one of them) than to understand that cognition arises as the process of a larger system that includes brain, affectivity and intersubjectivity.

However, another type of solution has aimed, not to dissolve the question, but directly to brand, in the purest consequentialist style, this quarrel as metaphysical for being insubstantial to practice (Baumgartner & Wilutzky, 2017; Stephan & Walter, 2020). Finally, another third major group of responses or reactions (also that of Stephan, 2018; Coninx & Stephan, 2021), which is not at all incompatible with the other two, has been to consider it more appropriate and useful to speak of *varieties of scaffolding* instead of *embeddedness* and *extendedness*. The concept of *scaffolding* condenses the idea "that human cognitive capacities both depend on and have been transformed by environmental resources" (Sterelny, 2010, p. 472); a term already used by A. Clark (1997, p. 63) acknowledging the influence of L. Vygotsky (1934), as well as the Gibsonian (1979) view of "perception, as geared to tracking possibilities for action" (possibilities known as *affordances*).

## **(Difficulty 2) Representations of What**

Moving from this dispute. Another internal division that makes it difficult to define post-cognitivism refers to the role of mental representations in cognition. For example, there is the distinction between *weak embodiment* and *radical embodiment*. To put it quickly, the *weak* version assumes that representational functions of the external world do occur in the human brain, but that these representations are intrinsically linked to bodily possibilities and actions. These are so-called *body-formatted representations* (Goldman & Vignemont, 2009). At an intermediate level between weak and strong embodiment, I can situate what is known as "sensorimotor contingencies" (O'Regan & Noë, 2001; Noë, 2001). For these authors, phenomenological perception is always mediated by body

movements which, in turn, depend on the link between sensory neural processes and motor neural processes. Nonetheless, a certain representationalism is to be expected from these authors. Finally, on the other extreme, the proposals of *radical embodiment* reject any type of representation to speak of the active role of the body, understanding that the body would be in a constant dynamic of exploration and learning, so that it would already be "knowledgeable" of the environment, or rather, it would already be moulded and would be the moulder of the environment (Chemero, 2009).

It can be said that these authors continue the path of *ecological psychology* opened by Gibson (1979), for whom perception does not involve mental addition of information but perception is of *affordances*, i.e. of behavioural opportunities perceived directly in the environment, without the need to represent information. Hence, this discussion goes beyond the "E" labels. For example, inside this panorama of radical embodiment some authors, such as H. Dreyfus, had taken more from phenomenologists such as Merleau-Ponty (1945) to argue against the primacy of representational knowledge and vindicate the primacy of the phenomenological experience of *skillful intentional actions*. For phenomenologists, practical knowledge or "know-how" is immersed in the immediacy and the history of a context. Skillful actions are knowledge prior to any categorisation and reflection. All in all, many of these radical authors argue that the dynamic process of knowledge is absolutely non-representational and is completely embodied in the body and structures (Di Paolo et al. 2017; Bruineberg et al. 2018). For them, be it embodied or phenomenological, cognition would have a kind of "direct access" to the world. Finally, more directly displaced to the problems of the field of ontology is the *radical enactivism* defended mainly by D. Hutto (2013). *Radical enactivism* understands that knowledge and meaning, both intentionally directed and in the form of perceptual experience, is produced pragmatically, without the need for any representational content.

To sum up, crucially for the radical view is that organisms co-determine themselves with the environment or structure in which they participate by dynamically adapting their own capacities to the opportunities offered by the environment, so that this happens without the need for rational processing. However it is still a matter of debate whether these approaches find it difficult to defend themselves against being accused of behaviourist reductionism, such as the behaviourism of robots Brooks (1991) or to disregard the problems of considering cognition from a complex punishment-reward adaptive perspective. Importantly, all of them defend a theory of non-linear causality, based on the complication and emergence that follows from dynamical systems theory (Chemero, 2009; Richardson & Chemero, 2014; Hutto, 2013; Di Paolo et al., 2017; Gallagher, 2017; Heras-Escribano, 2019). Unsurprisingly, the way they apply the insights of ecological psychology and dynamic systems theories is also open to question (see e.g., Heras-Escribano, 2019; DeLanda, 2021).

If the above is already happening the possibility for characterising post-cognitivism, there are also those who, while emphasising the action-perception link, nevertheless explicitly state that cognition is mediated, to a greater or lesser extent, by inferential processes that occur mainly in the brain (Millikan, 1984; Metzinger, 2003; Friston, 2012; Hohwy, 2013; Clark, 2013, Seth, 2013). According to these authors, these processes, mainly rooted on “Helmholtzian” inference and mainly based on Bayesian statistics, work to generate models of action and perception that aim to reduce the surprise or discordance produced by external inputs (Hohwy, 2013; Friston, 2013, 2022; Clark, 2015; Badcock et al., 2019). These models, despite being co-involved with motor action and the transformation of the environment (“active inference”), would have the status of representations about the state of the world. Therefore, they would reject the version of direct access.

In short, one of the crucial debates in the cognitive sciences is the degree of “representationalism”, “inferentialism” or internalism that each author wants to accept (Bruineberg et al., 2018); or as had also been phrased: how “weak” or “strong” is the commitment to the embodied stance (Gallagher & Bower, 2014; Gallagher, 2017). For some representations are a completely necessary part of the phenomenon of cognition while for others it is an absolute modernist ballast that limits the change of perspective. Once again, from their conclusions it follows that the world should be populated by minds, at least “basic minds”, beyond the human and even the animal, that share this same mode of cognition.

From a purely methodological point of view, there is a major debate about what the basic unit of analysis should be. As we have seen, the radical positions of enactivism and embodiment, as well as ecological psychology and the application of dynamic systems theory, generally understand that the organism-environment system is absolutely irreducible and must be studied structurally or, as mentioned above, co-determined. In general, however, positions close to predictive processing, while emphasising the active co-involvement of the organism with the environment, understand that the cognitive process occurring in the subject must be the basic and central unit of analysis. A third group of authors, mainly among the phenomenologists, insist on the possibility of a science explained by experience, some of them, such as Froese (2018) or Zahavi (2016), do not focus on structural experience or collective synchronisations or resonances, nor on a strictly personal experience, but generally on what they consider to be a *second-person perspective*, where two subjects can understand each other *directly* at the same time.

Currently, we can say that this question is the practical side of the more metaphysical and ontological quarrel. The need to decentre neuroscientific research from the representational role of the brain is already on the table of scientists (Makeig et al., 2009; Engel, 2013; Parada et al., 2020; Buszáki, 2020). Many studies have already made progress in this direction (see p.e. Griffiths et al., 2016; Gert et al., 2022), although there are still many technological



difficulties in bringing large brain scanning machines out of the stagnation of laboratories<sup>10</sup>. Some have already called it *Real World Neuroscience*<sup>11</sup>. Moving out of the laboratory may encourage a shift to a post-cognitive perspective, or it may mean a broadening of the understanding of the abstract information processing that brains do in human everyday lives. Which perspective to use, or where to set the minimum unit of analysis, are still questions to be settled and tested.

### **(Difficulty 3) The Expansion of the Agent**

That said, I leave these questions in the air. For, just as there are these disputes, there are also new contributions that find their place in the post-cognitivist agenda. A crucial example of this is the development of concepts that examine cognition on a social scale. I refer to concepts such as *distributed cognition* (Hutchins, 1995; Henrich, 2004a; Jaegher, Di Paolo, Gallagher, 2010), *participatory sense-making* (De Jaegher & Di Paolo, 2007), *niche construction* (Sterelny, 2010) *material engagement* (Malafouris, 2018), *environmental scaffoldings* (Stephan & Walter, 2020), *mindshaping* (Zadwinski, 2013) or *mind invasion* (Slaby, 2016). These concepts, although they nuance, agreed on not alluding exclusively to the idea that cognition operates by relying on environmental tools as suggested by extendedness and *some variations* of scaffolding like unidirectional user-resource interactions (Sterelny, 2010; Stephan & Walter 2020). Instead, these concepts shed light on the cognitive phenomena that are *generated* through social and cultural engagements in a given environment. Hence, cognition is not understood as where participants and other extracranial resources and artefacts divide up tasks (Hutchins, 1995; Huebner, 2014). Rather, such cognitive states are considered to be produced by coordination, synchronisation, or in a process analogous to what Simondon (1964) called “resonance” (Mühlhoff, 2019) and what are now regarded as *strongly coupled interactions*, regardless of whether they are unidirectional or bidirectional, conscious or unconscious, or whether the interaction is aimed at reaching an outward or inward change (Coninx & Stephan, 2021).

In another direction, the study of social cognition provides further evidence of the need to add the role of emotions and affectivity in the study of 4E and situated cognition (Griffiths & Scarantino, 2005; Krueger, 2014; Colombetti and Roberts, 2015; Colombetti, 2017). The 4E approach does not only deal with

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<sup>10</sup> These experiments are mainly performed with EEG, supplemented in some cases with other measures such as heart rate variability. Precision technologies such as fMRI brain scanning have not yet been used. Moreover, this technological limitation is compounded by mathematical difficulties, as the "real world" scenario is prone to signal errors: not only does the amount of noise increase considerably because many more different variables have to be captured than in static experiments, but the movement itself creates noisy artefacts. Moreover, as the variables depend on the environment, it is more difficult to isolate them. How this can be dealt with and what is a scientifically acceptable amount of noise has not yet been agreed upon. All this means that it takes a long time to prepare the preprocessing in order to be able to replicate the experiment. For a concise summary of the situation see Gallagher et al. (2013, p.421).

<sup>11</sup> This was the title of a series of lectures that Prof. Peter König began to give us in the winter of 2021-22.

"cognition" in the classical sense of knowledge, understood only as a rational exercise, but that emotion or affectivity enters into cognition, not only as an influence but as something that is fully part of it. Emotion is inseparable from cognitive processes (Colombetti, 2010, 2014) and, therefore, neither is it inseparable from the inevitable affectivity that occurs while inhabiting its *Umwelt* (*situatedness*). There is, indeed, an intense debate, epitomised by J. McDowell and H. Dreyfus<sup>12</sup>, as to whether ideas always permeate all experiences or whether there are some that do not yield to the "myth of the mental". Thus, while McDowell believes in the permeability of the cognitive and the inevitable cognitive bias that exists in all "the given", Dreyfus argues that there are forms of "absorbed coping", which affective and practical escape conceptual rationality.

But, be that as it may, the presence of affectivity is unavoidable. So, on the one hand, this forces us to consider the role of factors pertaining to emotion or mood (Stapleton, 2013; Colombetti, 2014; 2017; Krueger & Szanto, 2016), but also to interoceptive states such as hunger, fatigue and sexual desire (Panksepp, 1998; Damasio, 2003). But on the other hand, in conjunction with proposals set out above, it also opens us to deal with distributed emotions and the amplifying effect that is generated collectively in a dialectical and/or recursive way when strongly social engagements occur (De Jaegher, 2007; Colombetti & Roberts, 2015; Stephan & Walter, 2020). Indeed, the 4E's of cognition, may deviate from their anti-Cartesian purposes if they forget this affective dimension in which "it is not just emotion or the conscious feeling of emotion that is important; rather, non-conscious and wide-ranging affective processes that manifest in terms of hunger, fatigue, pain and pleasure, satiation and satisfaction can bias perception and thinking" (Newen, 2018, p. 11). However, here again we must be mindful not to treat emotions in an internalist way. To properly apply the post-cognitivist conception to emotion, must be to ask how affectivity is grounded in our bodily nature and not just look at how it influences or is influenced by cognitive processing (Stephan & Walter, 2020, p. 302-303).

At this point, these have been sufficient notes for an overview. What has been shown here is a field of study that moves across a very broad spectrum, ranging from the physical and unconscious to the symbolic and social in a dynamical and relational way. For this reason, some choose to schematise the programme in such a way that it is not a question of adding or subtracting acronyms. For example, I refer to the following three-dimensional scheme: post-cognitivism = *sensorimotor contingencies* + *affectedness* + *intersubjectivity*. This last formula is used in neuroscience (Engel et al., 2013) or by Gallagher himself (2017; Gallagher & Bower, 2014). However, it is clear that many will soon criticise if it is possible to distinguish between these levels or dimensions when there is only complete permeability between these three. Definitely, no one will consider the

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<sup>12</sup>The debate takes place approximately in correspondence and colloquia between 2005-2013, years after the publications of their most renowned works: *Being-in-the-World: A Commentary on Heidegger's Being in Time, Division I* (Dreyfus, 1990) and *Mind and World* (McDowell, 1994). I refer the reader to the discussion in Schear (2013).

existence of one of these three levels in isolation. For example, proponents of phenomenology and ecological psychology, generally, would agree that there are not three dimensions, but only one experience, and would ask whether it is worth considering these aspects separately or whether such a move would take us away from the crucial point.

### **Conclusion: Post-cognitivism as an Habit-Centred Epistemology**

All that I have just very superficially set out are the current general vicissitudes of these philosophers in locating the *where* of cognition. Concretely, it is seen that the issue of describing *the process that characterises cognition* and the question of *where the cognitive process ends* are two even questions; or one and the same. And therein lies the debate. The shared minimum slogan is that “cognition does not only happen in the head”, but as seen in the debates above, *alongside that minimal definition we see that it is also tremendously important that a more relational, practical, dynamical and systemic approach to the organism-world relation is pervasive in the paradigm*. Thus, at the core of these debates is more than just a shift away from an idea-centred cognition. These epistemological debates emphasise the active, transformative and malleable role of mind, brain, body and environment, and highlight the role of psycho-motor skills and performance possibilities. But how can we properly define that?

I hold that from the above synchronic overview of the main discussions of post-cognitivism we can begin to perceive the importance that the concept of *habit* can have for the definition of post-cognitivism. And here I advance a very simple first conclusion on which I will focus: the common definition of minimums of post-cognitivism does not only pass through the critical objective of decentring cognition from the brain, but also bets on an epistemology based on the cognitive relevance of habits; a “habit-based epistemology” (Legg & Reynolds, 2022). In fact, a conception of cognition as based on the dynamics of habit, habituation and inhabiting permeates all post-cognitivism beyond all the discrepancies and difficulties concerning representationalism, constitution problems or where to fix the basic unit of analysis. *The first thesis is that defining post-cognitivism by being a habit-based epistemology is much more informative than saying that “cognition is not only in the head”.*

However, the concept of habit cannot be explained only with the above. The following section (§3) will be devoted to unravelling it a little more. Agent’s habits are fundamental to post-cognitivism and we will try to observe the basic premises of this concept together with its normativity. In this sense, the proliferation of discrepancies and nuances within post-cognitivism, far from complicating the matter, helps us to observe where its commonalities lie and, with it, help to define its underlying presuppositions. But before going deeper in analysing the habit based-epistemology, I consider it important to complete this synchronic view of post-cognitivism with a diachronic one (§2.2).

To sum up, let me add a few conclusions on what has been said so far before moving on to the next section:

- That we can affirm that post-cognitivism offers a definition of minima. Their core conception is that of decentring cognition beyond the brain or a central processing unit. However, if on the one hand the decentralising proposal is explicitly defended, on the other hand, the absolute limits of the cognitive process are neither clear nor defined. However, although this goes against a definition that sets out necessary and sufficient criteria, I believe that perhaps it must necessarily be like this: for as this same paradigm argues, being the where of cognition something "situated", "distributed", "dynamic", we should not expect that the definition of this paradigm is not in turn situated, distributed and dynamic.
- That even if we try to turn a blind eye to post-cognitivism, its questions quickly find themselves *situated* in the midst of other fundamental questions about life in their ontological and epistemological scope, which also have their practical sides in terms of methodology and, as we shall see, normativity in research. I would argue that, if so many disputes arise, it is because the central question of this science is to understand what *human* cognition is and not what cognition in general is. However, the point very well may be that we have not yet decided whether to answer this question in an anthropocentric way or not.
- Finally, it seems that with the present exposition one can begin to glimpse that implicit in this whole paradigm, and despite all its internal discrepancies, is the idea that habitus is a fundamental form of agents' cognition. "Habit-centred epistemology" is a loose definition, but it could be a much more informative characterisation of the main tenet of post-cognitivism.

Having said this, let me continue to situate post-cognitivism, this time from a more historical point of view. With it, I held that the centrality of habit will become even more clear.

## 2.2. The Historical (in)Definition of Post-cognitivism

I once heard it said that to *philosophise* is to philosophise against someone. For what concerns our subject matter, despite the difficulties of post-cognitivism in explicitly achieving a definition of cognition beyond the minimal definition, namely, that cognition does not only occur in the head, it is also widely accepted that post-cognitivism emerged accompanied by a motivation to distinguish human cognition from a computationalist version of cognition. At its birth, post-cognitivism could be defined as a reaction against what was then prevalent in the philosophy of mind due to advances in computing, cybernetic theory and functionalist models. Thus, although the attempt to overcome mind-body dualisms is at the root of post-cognitivism, its historical context shows that its emergence was intertwined with a distrust of approaches such as functionalism and computationalism, understood as reductionism.

To illustrate this, I will outline some moments in the development of philosophy of mind since the beginning of the twentieth century in the West where modulations of the anti-dualist gesture take place. Many authors will be outlined here, but remarkably, the aim is to expose that a philosophy of habit serves us as a perfect backbone. I consider this a kind of genealogy of post-cognitivism (/ "archeology of habit"). This interests me because it helps to explain why the concept of habit is fundamental, but also *why it is not made explicit in post-cognitivism*. The philosophical history of the concept of habit will give us a lot of information about the current assumptions of post-cognitivism (a topic that will be addressed in §3).

As a small preliminary note to this brief history, it is worth recalling that the philosophy of mind belongs to a context in which the philosophy of science begins to interfere in branches beyond physics. Over time, the deepening of quantum theory and the apparent inapplicability of the logical-deductive model to other sciences, such as biology or sociology, encourage science to justify itself in terms of probability and predictability rather than in terms of description and explanation. At the same time, as I have said, computer science and information theory are gaining interest and power. In addition to all this, the geopolitical situation is conducive to a strong immigration of German philosophers to the USA. Having said that, in order to justify the importance of habit in post-cognitivism, for then analysing its presuppositions, and then to see what Deleuze says about habit, I insist: let's situate ourselves.

### **"Habit" at the Beginning of the 20th Century: Explicit Mutability**

I can start this overview on the genesis of post-cognitivism by recalling that it was the pragmatist George Edward Moore, in his work *Principia Ethica* (1903), who most explicitly focused the cognitive problem carried over from Kant on the particular question of how we understand ethical terms such as "goodness". For Moore, concepts such as "the good", but also colours, are only comprehensible if they already belong to the agent's conceptual stock. These concepts are not deduced from other concepts, they are not "analytic" in Kantian terms: they are only perceived. We could point them out when they appear to us, but we cannot be sure that another subject conceives the same thing. For Moore, human cognition is characterised by a combination of a pragmatic, deictic and intersubjective learning, together with an intuitive intellection of these special concepts<sup>13</sup>; a combination of pragmatism and epistemological dualism, so to say.

This "dualist" perspective followed that of the founders of pragmatism: Charles Sanders Peirce and William James. Peirce and James are well known in the

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<sup>13</sup> With Moore, but especially in C.S. Peirce, one can observe how certain questions of philosophy of mind are indistinguishable from questions of philosophy of language. This will be the case in much of analytic philosophy. Most notably, this is seen in Peirce's sign theory; for this issue, I refer to Legg & Reynolds (2022): "*as we believe that [Peirce'] semiotics, which analyses sign-use as habit, shows how theorists of embodied cognition can break a certain false dichotomy between embodiment and logical or intellectual structure which is arguably hampering their work*" (Legg & Reynolds, 2022, p. 1).

post-cognitivist literature, not only for raising specific epistemological questions, but also for overcoming the *ontological* dualism that separates mind and world with their philosophical systems labelled "*continuism*"<sup>14</sup> and "neutral monism"<sup>15</sup>, respectively. Both authors defended a relational world impossible to understand if it were to be sustained under Descartes' *static* mentalism. They conceived that meaning (Peirce) or truth (James) depends on its practical consequences and is a knowledge that is always subject to further revision; especially Peirce, in parallel to a linguistic theory of sign use where beliefs are habits of thinking.

However, both philosophers ground their theories in the existence of non-rational qualitative experiences. Peirce spoke of first qualities or sensations which appear in consciousness, "*Firstness*"<sup>16</sup>. These sensations, only after being related to further sensations, things and consequences, constitute the basis of intellectual concepts. Also, for James there is a state of consciousness connected to *pure experience* where subject and object disappear<sup>17</sup>. In turn, in both there is room for the existence of divinity. In James' philosophy, for example, the universe is understood as having *indeterministic* laws<sup>18</sup>, God is a humanly preferable consequence<sup>19</sup> and mystical experiences are sources of credibility<sup>20</sup>.

There is still more. For this complementarity between pragmatic knowledge and "*impracticable knowledge*" (*firstness*, quality, indeterminacy, God...) was present in Charles Darwin. In fact, C. Darwin was for Peirce and James one of the most important references, although may seem incompatible. But nothing could be further from the truth. For we can think of Peirce as a systematiser of linguistics, ontology and metaphysics derivable from Darwin's contributions<sup>21</sup>. In fact, Darwin speaks of several active "principles" that occur in what in

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<sup>14</sup> "Since space is continuous, it follows that there must be an immediate community of feeling between parts of mind infinitesimally near together" (Peirce, "*The Law of Mind*", CP 6.134, 1892). And take this continuity together with a deeper mind-matter continuity raised by the law of habit: "regard matter as mind whose habits have become fixed so as to lose the powers of forming them and losing them" (Peirce, "Uniformity, in Baldwin's Dictionary", CP 6.101, 1901).

<sup>15</sup> "The paper seen and the seeing of it are only two names for one indivisible fact which, properly named, is *the datum, the phenomenon, or the experience*. [...] paper and mind are only two names that are given later to the one experience" (James, 1895, p. 110).

<sup>16</sup> "Firstness is the mode of being which consists in its subject's being positively such as it is regardless of aught else. [...] The mode of being a redness, before anything in the universe was yet red, was nevertheless a positive qualitative possibility. And redness in itself, even if it be embodied, is something positive and sui generis. That I call Firstness. (Peirce, CP 1.25, 1903).

<sup>17</sup> "The instant field of the present is always experience in its 'pure' state, plain unqualified actuality, a simple that, as yet un-differentiated into thing and thought, and only virtually classifiable as objective fact or as some one's opinion about fact". (James, 1904, p. 564).

<sup>18</sup> "The indeterminism I defend, the free-will theory of popular sense based on the judgement of regret, represents that world as vulnerable, and liable to be injured by certain of its parts if they act wrong. And it represents their acting wrong as a matter of possibility. [...] It gives us a pluralistic, restless univers." (James, 1884, p.176-7).

<sup>19</sup> "To test saintliness by common sense, to use human standards to help us decide how far the religious life commends itself as an ideal kind of human activity. If it commends itself, then any theological beliefs that may inspire it, in so far forth will stand accredited." (James, 1902, p.235)

<sup>20</sup> See, *The Varieties of Religious Experience* (1902).

<sup>21</sup> It is perhaps Chauncey Wright who philosophically expounded Darwinist ideas to the Cambridge *Metaphysical Club* to which Peirce and James belonged.

retrospect, is seen by humans as the product of natural selection: Darwin speaks of the principle of adaptation, but above all, he speaks of the necessary contribution of mutation and of the spontaneity in adaptation. For him, these principles are combined in the act of executing habits in order to move organisms towards survival (as shown, among others, in his works of 1875 and 1881)<sup>22</sup>. Peirce, for his part, speaks of three principles or tendencies: chance, law or order and, indeed, also habit as a mediating instance. I will come back to this point.

Indeed, for Peirce habit is an agent's way of knowing the world but it is also a metaphysical principle that orders the universe<sup>23</sup>. In abstract terms, for Peirce, habit promotes repetition to manage chance, as it is a tendency "actually to behave in a similar way under similar circumstances in the future"(CP 5.487). But, habit is a law which is not only limited to uniformity and unification, but habit itself responds to a deeper principle: "*the habit of taking and laying aside habits*" (Pierce, "Uniformity, in Baldwin's Dictionary", CP 6.101, 1910)<sup>24</sup>. Indeed: "This law of habit seems to be quite radically different in its general form from mechanical law, inasmuch as it would at once cease to operate if it were rigidly obeyed [...] growth seems to indicate a positive violation of law". (Peirce, "Reply to the Necessitarians", CP 6.613, 1891).

The *potentiality* of habits is clearly seen in Pierce and Darwin, but I could also have mentioned James<sup>25</sup>. All in all, the concept of habit has been one of the centres in the philosophy of the following pragmatists relevant to the present of post-cognitivism. In this sense, J. Dewey, although from a much more naturalistic and instrumentalist approach centred the study of habit on its psychological and *social dimensions*<sup>26</sup>. Dewey emphasised habits as one of the organic constituents, along with impulses. Impulses, Dewey says, although ubiquitous, vary in number or are attributed to one purpose or another (survival, fear, sexual desire...) according to the purposes of the times (Dewey, 1922,

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<sup>22</sup> Here is Costall (2004, p.188) quoting Darwin: *Yet the worms proved to be impressively flexible and astute, heading for the optimum part of the leaf. They were, Darwin insisted, far from the mechanical automatons of Cartesian psychology: "They act in nearly the same manner as would a man, [...] They do not act in the same unvarying manner in all cases" (Darwin, 1881, p. 313). I have referred to the books: *On the Movements and Habits of Climbing Plants* (1875) and *The formation of vegetable mould, through the action of worms with observations on their habits* (1881).*

<sup>23</sup> "If the universe is thus progressing from a state of all but pure chance to a state of all but complete determination by law, we must suppose that there is an original, elemental, tendency of things to acquire determinate properties, to take habits. This is the Third or mediating element between chance, which brings forth First and original events, and law which produces sequences or Seconds." (Peirce, "One, Two, Three: Kantian Categories", EP 1.243, 1886).

<sup>24</sup> For more on this topic see Nöth (2016).

<sup>25</sup> "The moment one tries to define what habit is, one is led to the fundamental properties of matter. The laws of Nature are nothing but the immutable habits which the different elementary sorts of matter follow in their actions and reactions upon each other. In the organic world, however, the habits are more variable than this. [...] They can do so if the body be plastic enough to maintain its integrity, and be not disrupted when its structure yields". (James, 1890, I, IV, p. 105)

<sup>26</sup> "An understanding of habit and of different types of habit is the key to social psychology" (Dewey, 1922, p. iii).

p.130)<sup>27</sup>. All in all, Dewey's impulses are the organic translation of Peirce's and Darwin's chance. It is specially from Dewey, but also from G. H. Mead, that we get an emphasis on the organic *coordination* or reciprocity between organism and environment in the field of cognitive studies<sup>28</sup>.

But the relevant point of all this retrospective is that the concept of habit appeared with great force (or rather, with *many* forces) in this philosophical context. To be highlighted is that, "chance", "change", "mutation", "impulse", "spontaneity", but also "firstness" and "pure experience" were, for these *Darwinian pragmatists*, compatible with the conception of habit that allowed them to move away from a cartesian epistemology focused on the mind's inferences and intentions while at the same time moving away from mechanicism. Habit was the crucial concept for them, *for habit made possible to unite knowledge with motor action, to unite intelligibility with corporeality, to unite body and environment, to unite nature with metaphysical principles, to unite chaos and order*. This was a key moment for cognitive science from which we can start to trace its various receptions. In particular, in the years to come, three main directions that influenced the cognitive sciences emerged as a result of this tension between this dual source of knowledge, the practical knowledge and "impracticable knowledge", to which the habitus gave a first response: mystical dualism, emergentism and behaviorism.

On the one hand, the philosophical climate enhanced by these classical pragmatists, was followed, on the one hand, by the exponents of *the New Realism*. Among these, R. B. Perry and W. P. Montague were North-Americans who, during the 1920-30s, considered that qualities, such as blackness, exist in the world outside the subject. According to them, following James' monism, consciousness is identical with external reality, so qualities were not a reflection of reality, but a particular entity that appears in the mind. These were contemporary of A. O. Lovejoy. Lovejoy was critical of pragmatism, of B. Russell (who sought a symbolic system in order to reduce science to logic) and of New Realism. Lovejoy spoke of the inescapable use of qualitative abstract perceptions, by returning to a metaphysical dualism<sup>29</sup>. Moreover, he spoke of *vitalism*, which

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<sup>27</sup> His reflections on impulses, which are one of the three characteristics of human conduct together with habit and intelligence (Dewey, 1922), has not gained importance for post-cognitivists.

<sup>28</sup> In psychology this conception has led to the recognition of mental life as an organic unitary process developing according to the laws of all life, and not a theatre for the exhibition of independent faculties. [...] With the conception of environment comes the impossibility of considering psychical life as an individual, isolated thing developing in a vacuum. (Dewey, 1884, pp. 278, 285) "Since organism and environment determine one another and are mutually dependent for their existence, it follows that the life-process, to be adequately understood, must be considered in terms of their interrelations. (Mead, 1934, p. 130)

<sup>29</sup> Courtesy of Johns Hopkins University:  
<https://krieger2.jhu.edu/philosophy/Lovejoy/Are%20Our%20Percepts%20in%20Our%20Heads.pdf>  
) last visit 28/12/2022.



was nothing but an anti-reductionism<sup>30</sup>; and he speaks of the points of co-implication of pragmatism and theology<sup>31</sup>, as have now also been pointed out of phenomenology.

In another track, following the wake of Darwinism and close to vitalism, *the emergentist* positions emerged, with L. Morgan, S. Alexander and C. D. Broad, who emphasised a creative aspect through the breaking of biological mechanical linearity. After all, working in biology research, they knew that Darwin postulated that the principle of mutation is essential for natural selection to act. But it was a principle that Darwin had not addressed and to which they wanted to provide an answer. To do that, they offered theories about how qualities observed from a larger scale could arise when particular elements were combined and structured. But despite their good descriptions, causal explanations verged more on theology than what was expected of a scientific explanation.

The thing is that a completely opposite trend appeared then. Opposed to Lovejoy's spiritualism, opposed to symbolic logicism, and blind to emergentism, there appeared a current animated by experimentation: *behaviourism*. This approach of Watson (1913) and his predecessor, E. Thorndike, represents a crucial antithesis to the pragmatist perspective of the time: at the basis of which lies a different conception of habit which has survived to the present day.

Behaviourists focused (and still focus) on the associative and reiterative mechanism of habitual behaviour. In particular, their conclusions follow from animals subjected to extreme experimental conditions, among which stand out the devaluation of reinforcements together with the deprivation of the possibility of finding other reinforcing stimuli, as well as the exclusion of natural context. Their research uncovered a habit that is far from the conception of the early pragmatists/phenomenologists. As I said, earlier pragmatists stressed that habits contain traces of chance, flexibility and mutation, while insisting that habits imply a continuity between mind, world and environment. As Costall (2004) points out:

*"Darwinism also gave way to what one might call Huxleyism, the displacement of in vivo natural history by the in vitro examination of isolated "preparations" (living or dead) favoured by experimental physiologists. Furthermore, psychology's own agenda turned more to technological control rather than self-understanding (Danziger, 1979). Linked to all this was the rise of Watsonian*

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<sup>30</sup> "What the vitalist maintains is that, even given a complete knowledge both of all the laws of motion of inorganic particles and of the actual configuration of the particles composing a living body at a given cross-section of time, you could not from such knowledge deduce what the motion of the particles, and the consequent action of the living body, would be. What he asserts primarily, in short, is the doctrine of the logical discontinuity, at certain points, of scientific laws." (Lovejoy, 1911, p.612)

<sup>31</sup> "The demand for a God who shall be "one yesterday, today, and forever," is simply the requirement of relaxation, of rest in an experience which shall be in some way larger than ours. And I see not why this need is not met by pragmatism as easily as by absolutism" (Lovejoy, 1908, p.240).

*behaviorism [...] the return of the conception of the body as a passive mechanism, or, in other words, stimulus-response psychology.* " (p. 188)

*This is a fundamental first gesture to understand the current philosophical drift of the conception of habits in human cognition and to understand the current presuppositions that we find in our science. But having said that, I leave this story here for now. Let's go back to the beginning of the 20th century again, but moving on the map.*

### **“Habit” at the Beginning of the 20th Century: Diluted Experience**

In Germany, Edmund Husserl, in his book *Logical Investigations* (1900), trying to unravel the constituents of mental contents, posed a motivational component situated beneath expression and sign or, to use Frege's terms, in addition to "sense" and "reference"<sup>32</sup>. This motivational component implied a relational and dynamic conception of thought. In turn, Husserl argued for the existence of personal contents which have the form of an intuition and of non-reflected private experience. If for F. Brentano personal contents were inseparable from the experience of the intentional act, for Husserl these contents may exist independently, as abstract ideas (certainly close to a Platonic theory of knowledge) which nonetheless are experienced only from a particular perspective in “live functioning” (similar to James' pure experience). With all this, Husserl was inaugurating *phenomenology*. Which at the time was the method for approaching the correct logical foundation of thought, organising, from own experience, the parts involved in a mental content.

In analogy with pragmatism, phenomenological philosophy of mind was inseparable from a philosophy of the structure of language and thoughts. Equally important was to point out the irreducible components in lived experiences, remarkably, because it was necessary to place mental contents on a temporal and relational basis. In this sense, phenomenology gave particular emphasis on understanding time and time in consciousness.

Discussing the basis of experiences became a very important issue for phenomenology, as exemplified by the Phenomenological Circle in Munich. But this same problem influenced the logicist current that was developing in Germany and the Vienna Circle. Moritz Schlick is a case in point. In 1918, in his *General Theory of Knowledge*, he promoted a logical identity between experienced mental and physical states but showing its epistemological duality; an idea that will be recurrent in analytic philosophy (see W. Sellars or D. Davidson). In Austria, Wittgenstein, who worked between Frege and Russell,

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<sup>32</sup>“A thing is only properly an indication if and where it in fact serves to indicate something to some thinking being. If we wish to seize the pervasively common element here present we must refer back to such cases of 'live' functioning. In these we discover as a common circumstance [...] that *his belief in the reality of the one is experienced* (though not at all evidently) *as motivating a belief or surmise in the reality of the other*. This relation of 'motivation' represents a *descriptive unity* among our acts of judgement.” (Husserl, 1900, p.184)

demarcates in the *Tractatus Logico-philosophicus* (1921), in an almost religious way, the limits of things that can be talked about *logically*. He insinuates the existence of non-transferable and defining experiences of cognition. All in all, in this logicism, irreducible and private experiences are very much taken into account, only that either they are to be assigned a "symbolic unit of measurement" or they are to be left out.

It was the 1920s-30s, when the late Husserl of *Cartesian Meditations* (1929) and Heidegger's work, *Being and Time* (1927) finally displaced the qualitative and irreducible experience from within the walls of the subject's thought and placed it, instead, in a personal experience inseparable from its practical dimension and dependent on intersubjectivity and its particular situation in the world (*Umwelt* or *Lebenswelt*). In this climate, the concept of habit (and inhabiting) was central for understanding life and consciousness. Habits unite agents and context, units background history and future intentions: habits dilute the boundaries of personal experience in time and space. Thus, the logical "unit of analysis" becomes more diffuse. (Although, it is worth saying that particularly for Heidegger it is an experience of abstraction from the environment that allows for a sobering reflection for an *authentic* life, which is slightly unveiled in sensations such as boredom, tedium and ultimately anguish and worry<sup>33</sup>).

Phenomenology continued in German asking about the existential features of a human who experiences as a being-in-the-world with what became known as "philosophical anthropology" (P. Alsberg, M. Scheler, H. Plessner, A. Gehlen). Moreover, to add to this general picture, it was in these same years that representatives of Gestalt psychology such as K. Kofka moved to the USA. Gestalt experiments, influenced by phenomenology, showed that the unity and integrity of the experienced perceptual field cannot be explained solely by the sum of its atomic constituents, thus, arguing for the difficulty of investigating perceptual experience from a reductionist approach.

All in all, for these psychologists, phenomenologists and even logicians, physicalist reductionism is not an alternative, be it because of an epistemological dualism or because experience and knowledge spans through the context. But from this time onwards, things become more complicated. Therefore, let me add two reflections on that.

### **“Habit” at the Beginning of the 20th Century: Conclusions**

A first reflection that follows from these subsections is that most of these authors (James, Peirce, Darwin, Dewey, Husserl, Heidegger...), or *part of what these authors say*, are being mentioned in today's post-cognitivism. However, it is less talked about that in the midst of this back and forth at the beginning of the 20th century between the German logical and phenomenological thought and

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<sup>33</sup>This phenomenological pragmatism was also present in Ortega y Gasset, and in Heidegger's unmentioned readings of it. See *Meditations on Don Quixote* (1914) in which Ortega y Gasset expounds and develops "*I am I and my circumstance*".

North-American transcendentalist/pragmatist thought, the texts of another key figure of the time, Henri Bergson, close to vitalism and emergentism, are obscured in the influence of the philosophy of mind: I am talking about texts as interesting for our science as *Time and Free Will: An Essay on the Immediate Data of Consciousness* (1889), *Matter and Memory* (1896), *L'Évolution créatrice* (1907) or *Mind-energy* (1919). He speaks of original creation, of irreductionism, of memory and of customs and habits; in the latter case quoting the work *The Habit* (1853) by another Frenchman, F. Ravaisson<sup>34</sup>. Bergson, like H. Driesch somewhat similarly with the concept of *entelechy*, argued that life was not a mechanical or deterministic matter. In common was to identify a not entirely calculable, not exactly material impulse, a vital force, with very similar notes to the ontology of Peirce, James and to Husserlian temporality. This non-reception in the philosophy of mind is surprising, for, immediately before the great war between the Allies and the Central Powers, there was in the United States a new awareness of the universe as something living and incalculable, as a world of ceaseless and unpredictable change and possibility. However, despite his texts on mind and cognition, Bergson is often remembered as a metaphysician who debated with A. Einstein. But at the time, Bergson's first talk at Columbia University caused one of the first recorded traffic jams in New York. He was received as an advocate of freedom<sup>35</sup>.

The second and more direct reflection departs from post-cognitivism' double source of reference, namely, pragmatism and phenomenology. There are differences between the two sources in the methods of enquiry and exposition. However, there are two clear and fundamental notes that pragmatism and phenomenology, but also Darwin as well as vitalist, new-realist, gestalt and philosophical anthropology approaches seem to share: 1) *that habit is understood as an element that ontologically links mind, body and environment, past and future and cognition and action*; and 2) *that all of them appeal somehow to irreducible experiences that are considered cognitive and that have a basis in its ontological system*.

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<sup>34</sup> In *The Habit* (1853), Ravaisson expounds the double law of habit which stipulates that while in the realm of impression, the more repetitions there are of an impression the more its intensity is reduced, in the realm of activity, it is the other way round: the more repetition or reproduction, the more its intensity increases. Instinct is nothing but the reification of this higher degree of intensity. It is the moment when movement becomes independent of will. Which reminds us of Peirce, though written 50 years earlier. "Habit succumbs, not to mechanism or automatism, as Kant feared, but to 'attraction and desire', a 'law' that follows, paradoxically, not from necessity but from freedom itself" (Ravaisson, 2008 [1838]: 57).

<sup>35</sup> Even more in the margins of this exposition, we find the anti-positivist, phenomenological philosophy, concerned with logical axiomatisation and with a philosophy of values from Latin America; in many respects a predecessor and continuation of European ideas. And here, too, the first reflections of the Kyoto School remain on the sidelines, in similar contention. See for example: C. Vaz Ferreira with *Los problemas de la libertad* (1907) and *Lógica viva* (1910); R. de Farias Brito, *Un mundo interior* (1914); C. Alberini, *Introducción a la axiología* (1921); A. Korn, *La libertad creadora* (1922), *Axiología* (1930); or K. Nishida, *An inquiry into the Good* (1911).

However, there is one notable exception among those then focusing on the problem of cognition: *logicism does not adhere to 1*). From the perspective focused on the concept of habit, German logicism is analogous to the American behavioural exception. *But while behaviourism maintained the importance of habitus, albeit with a totally different conception from its predecessors, logicism directly disregards it.*

The concept of habit inherited from behaviourism will be important, but for the moment let us leave it aside and look at logicism. Because giving particular relevance or not to habit can serve to demarcate positions in the philosophy of cognition. As a study case we can observe the famous debate between R. Carnap and Heidegger in 1932. Both, a few years earlier, had published major works with Husserl at their roots: Carnap, a logicist, in *The Logical Construction of the World* (1928), reconstructs Husserlian phenomenology in analytical terms, and Heidegger, applying hermeneutics, dedicates *Being and Time* (1927) to Husserl. The division between the two is often considered to be at the origins of what will become the distinction between *analytic philosophy* and *continental philosophy*. Their philosophical style is absolutely different. But in theoretical terms they have been distinguished from each other in that Carnap attempted to systematise experience in formal logic by trying to translate the subjective-experiential plane into a symbolic-rational one, whereas Heidegger insisted that the symbolic plane is absolutely secondary, reflective in contrast to the practical primary plane. However, these are not so different positions when one looks closely.

For Carnap says that the object behind the metaphysical puzzles is nothing other than emotions about which there is no room for strict science: our experience of the world cannot be *verified*. And this is also what Heidegger affirms in other terms: the being recognises itself fully in this groundless world by some emotions that arise when living pragmatically, because rationality only helps to restore what is separated from the good practical functioning. Thus, the discrepancy between both philosophers is not about the importance of non-rational emotions. But the manifest discrepancy is between a philosophy, that of Heidegger, that sets the basis of cognition on an active agent grounded in its habits and the way it inhabits a context and another philosophy, that of Carnap, which does not consider habits in order to deal with cognition and thought.

The difference is crucial, but both projects will continue in history. Notably, between the years 1930-50 great advances and transformations took place from logic, for example, with A. Turing, A. Church, W. McCulloch, J. von Neumann, C. Shannon, K. Gödel<sup>36</sup> that would give birth to computational mechanics. In this

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<sup>36</sup> In his 1931 paper on the incompleteness theorem, Gödel shows that there are theorems of logical systems such as Russell's and Whitehead's *Principia Mathematica* which imply that these systems are either decidable or complete. Gödel strikes a severe blow at the claim to reduce arithmetic to logic. However, as he shows in a correspondence with von Neumann, where he suggests that the *Entscheidungsproblem* formulated by Hilbert can be solved if the proof requires a finite number of symbols (Gödel, 1956), his motivation is another paradigmatic example of the

context, the term "*qualia*" was coined by C. I. Lewis (1946) (as: *the felt characters of experience*), also for the sake of placing them as irreducible data at the base of a logical-deductive symbolic system... So experience and logicism continue to be closely related. But above all, we can characterise the formalist logicism analysis, as opposed to other cognitive sciences' approaches, for dispensing with considerations of habit in cognition.

### **“Habit” at the Second Half of the 20th Century: When Pragmatism Met Machines**

But something will change after the war between the Allied and Axis forces, which will change the concept of habit. Basically, linguistic pragmatism emerged as both a break with and a continuation of linguistic formalism and semantic approaches. Again it was Wittgenstein, in 1953, in his *Philosophical Investigations*, who wrote against the impossibility of language being logically formalised: language depends on the dynamics of its social use. The project of basing the sciences on logic collapsed. *So, everything seemed to point to the fact that as the pragmatic linguistic turn seemed to overcome the logicist staticity, it would seem that a pragmatic and dynamic philosophy of mind based on habit would have one less antagonist. But it was not. Authors such as M. Minski or A. Newell at the basis of computer science and AI, combined advances in formal logic and mathematics with technological developments: and their ally was none other than behaviourism.* So, they present some mechanical models of self-organising systems, developing the theoretical framework of what will be called "cybernetics". Mainly, logical structures serve to construct feedback loops architectures such as Ashby's *Homeostat* (1947), Walter's *Mechanical Turtle* (1951) and Rosenblatt's *Perceptron* (1957)<sup>37</sup>. Most notably for post-cognitivism, far from the static mentalism, a naturalistic complicity and a pragmatist conception is the common note in these computational projects. What succeeds is a dynamic and *adaptive* way of understanding symbolic computation although they rely on the importance of a central nucleus of symbolic processing in which representations are produced.

Remarkably, it happens that in all these mechanical projects, *habits come to be seen as the other side of the coin of the intelligence and creative process necessary for the cognitive process. Habits become mechanised patterns of action through optimal logico-symbolic routes.* From the history of the concept of habit, we are no longer at the point of the early twentieth century. In the second half of the twentieth century, habits corroborates its presence and relevance, but habit is placed in a concrete part of the cognitive process. *If, as I showed before, behaviourism and logicism were dissident positions with respect to the characteristic habit of pragmatism and phenomenology, then they became the hegemony of cognitive science by integrating this concept.* Far from the

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communion between German logicism and the American computational project, and not so much an anti-computationalist reference.

<sup>37</sup> Incidentally, this is set out with the publication of Walter's book *The Living Brain* (1953).

predecessor's conceptions, habit is then conceived thanks to the usefulness for artificial cognition as the mechanical and unconscious side of cognition. Thanks to this, artificial systems can work as active and, above all, as a self-repairing and adaptive system. After all, the cyberneticians already conceived of the brain as an embodied organ, intrinsically tied into bodily performances, with the aim of adapting its behaviour<sup>38</sup>. The brain is what helps us to get along and come to terms with and survive in situations and environments we have never encountered before. In a few words: before the 1940-50s, computationalism was linked to logicist projects, after that it became more linked to the naturalistic and pragmatist project. *The cybernetic emphasis on the adaptive question brings us closer to an embodied and situated position, however, the price to pay is that, paradoxically, it seems that the conception of habits is no longer Darwinian, but a Watsionian one.*

This seems to me to be the second critical step in the evolution of the conception of habit, and therefore, of post-cognitivism. I can illustrate this through another dispute: the debate between G. Ryle and M. Merleau-Ponty. Treated as a continuation of the debate between Carnap and Heidegger, the distinction between analytic philosophy and continental philosophy is inaugurated right here. However, some things have changed with respect to habit. In contrast to the previous debate, now these two philosophers share the concern of showing that it is characteristic of human cognition to develop in an active relation to a world of objects and persons in order to give it coherence. Ryle worked against the Cartesian and computational idea of the "ghost in the machine" (1949) by distinguishing between *know-how* (or practically knowing how to do something) and *know-that* (or theoretically knowing something or how to do something). In turn, Merleau-Ponty, in *Phenomenology of Perception* (1945), exposes perception as inseparable from the lived body position. The body is more than a physical entity juxtaposed to others. The movement of the body structures perception according to what the agent can or can't<sup>39</sup>. Yet, while Ryle found cognitively fundamental the relationship between action and knowledge, Merleau-Ponty found it in the relationship between action and perception. In fact, habit permeates both, yes. But Ryle, even though he claims to be against behaviourism, conceives habit as mere repetition distinct from an intelligence and flexible practice which is intervened by rationality (Ryle, 1949, p. 42). In contrast, Merleau-Ponty, conceived the "habitual body" as that of general experiential and pre-reflexive subject-world understanding distinct from reflexive existence (Moya, 2014)<sup>40</sup>. All in all, here too, in the context of analytical

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<sup>38</sup> "To some, the critical test of whether a machine is or is not a 'brain' would be whether it can or cannot 'think.' But to the biologist the brain is not a thinking machine, it is an *acting* machine; it gets information and then it does something about it" (Ashby 1948, 379).

<sup>39</sup> That he conceives the self as an "I can" and not as an "I think" is in debt of Maine de Biran, who, by the way, wrote the book *The influence of habit on the faculty of thinking* in 1802.

<sup>40</sup> "Habit expresses our power of dilating our being-in-the-world, or changing our existence by appropriating fresh instruments. [...] If habit is neither a form of knowledge nor an involuntary action, what then is it? It is knowledge in the hands, which is forthcoming only when bodily effort is made, and cannot be formulated in detachment from that effort" (Merleau-Ponty, 1945, p.166).

and continental philosophical separation, habit serves as the backbone of analysis. The debates will continue, but again those who lose the most are those who are not invited to the discussion.

From my point of view, two of the most crucial moments in the characterization of habit have been already exposed: that of the philosophy of the habit of the early twentieth century and that of the "naturalization" of computationalism in the 40s-50s with the birth of cybernetics. What follows is the reification of this last gesture until it reaches the context in which the post-cognitive is explicitly born. Accordingly, the analytic-continental debate took other forms. While cybernetics expands, on the continental scene, many voices, such as Heidegger (1954) and the Frankfurt School, are raised in opposition to the technological zeal relating it to the alienation from a "full existence" because of depriving humans from its environment. But at this very same time, at the margins of the debate, in 1953 (the very same year that Wittgenstein admittedly inaugurates linguistic pragmatism), Deleuze published his first book, *Empiricism and Subjectivity*, a monograph on Hume in which he worked in an innovative way on his pragmatic concept of habit as fundamental for reflexion, imagination and affectivity, while presenting his philosophy as "a sharp critique of representation" (Deleuze, 1953).

But Deleuze is not the focus of philosophy of mind, across the Atlantic, a research team including biologists, neurologists, cyberneticians and logicians (H. Maturana, J. Lettvin, W. S. McCulloch and W. Pitts) presented the paper *What the Frog's Eye Tells the Frog's Brain* (1959). This paper explicitly suggested experimentally the idea that "cognition just does not happen only in the brain". But it suggested something more, for it brought closer the idea that perception and cognition are hardly separable processes. However, this intertwining was certainly not incompatible with the possibility of being observed in experimentation with "organic" or "mechanical" systems. But an intriguing question was posed to philosophy of mind: what does cognition mean if it is also linked to perception and what does perception mean if it is linked to cognition? *This question of perception will be at the core of philosophy of mind from then on.*

### **Birth of Cognitive Science: Curling the Curl**

The next analytic generation, from 1960-1975, is one of the summits of philosophy of mind. It is the generation of N. Chomsky, D. Davidson, E. Gettier, S. Kripke, T. Kuhn, H. Putnam, W. O. Quine, J. Searle, W. Sellars... They inherited the problem of perception and cognition and they inherited the naturalised approach aiming to avoid any metaphysics and cartesian dualism. Thus, they focus on unravelling or dissolving concepts such as *mental states*, *intentions* and *self-awareness* with scientific explanations. *Physicalism and evolutionism*, on the one hand, are the main notes. With it they gave different epistemological solutions to dualism, which are more or less reductionist along

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the lines of a psycho-physical identification (different versions are offered of the theory of identity, of the theory of transparency... all of them with an emphasis on the analysis of language). On the other hand, they held a *pragmatist and revisionist* position that argues in terms of transitional coherence and intersubjective usefulness, instead of speaking of truths or formalisms.

The question of perception was not exclusive to the philosophers of the mind. Also the computational work of MacKay (1956), Neisser (1967), Pask (1972), Pattee (1973), Rosen (1973) and Gregory (1980), that became known as "analysis-by-synthesis", was the origin of what will become hierarchical computational cognitive models which include feedback loops for sharpening perception. Against this, T. Nagel, as well as Dreyfus (1972), insists that *the private* experience of "something that it is like to *be* that organism" (Nagel, 1974, p. 436) is irreducible.

But far from computationalism, far from linguistic analysis and far from mental experiments, was J. J. Gibson, a crucial figure for post-cognitivism, who exposes a theory inherited by E. B. Holt, who was an unorthodox behaviourist student of James (Heft 2001). In *The Ecological Approach to Visual Perception* (1966), Gibson proposed an alternative approach to deal with the relational experience of subjects-and-objects. He starts from the idea of organisms as active explorers. But from there, he focuses on external possibilities, called "*affordances*". Affordances are signified by the probability with which the subject considers them useful for an action: it is a "first-hand perception of being in-the-world", an *ecological information*, as opposed to computational sense of information as C. Shannon understood it (Gibson, 1979 p. 232). Remarkably, the underlying theme in Gibson was again task-relevant perception. In particular, Gibson's ecological information was conceived as a direct, unmediated insight into the world, although it was an insight dependent on the relation between subject and object. Gibson placed an alternative to inferential proposals of the mind, as computational ones. We'll come back to this.

Again, in one of the margins of the academic cognitive literature and philosophy of mind, it remains that in those same years, the philosophical stance of structuralism is strongly emerging in France as a parallel to coherentism and ecological organisation. Structuralism permeated almost all the sciences<sup>41</sup>. The reception of this structuralism only reached the North-American scene indirectly through Merleau-Ponty's structural thesis of perception. Deleuze follows closely, and in 1968 he published his ontology critical of Platonic-Cartesian epistemology: *Difference and Repetition*. *It is a time of great interest in the self-organisation of organisms* and Deleuze is an example, as is Gilbert Simondon, who in 1964 is teaching the *Cours sur la perception*<sup>42</sup> at the Sorbonne

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<sup>41</sup> I refer to J. Piaget, C. Lévi-Stauss, J. Lacan, R. Barthes, M. Foucault, L. Althusser, M. Merleau-Ponty...

<sup>42</sup>"Finally, positivism and the progress of biology give back to perceptual problems a primordial importance, because they discover in perception, human as well as animal, a functional activity, living relationship between the organism and the environment; [...] perception thus becomes again,

and publishes *Individuation in Light of Notions of Form and Information*. In 1977, I. Prigogine, another of Deleuze's references, received the Nobel Prize in chemistry for the work he had done since the mid-1950s on dissipative structures as the basis for the self-organisation of organic matter, based on non-linear structures (1955, 1977). Maybe the exception to this "marginal" insight came with Varela and Maturana, who work together on this issue and put forward the concept of *autopoiesis*<sup>43</sup>, with which the cognition-perception hiatus implies a regime of sensation and valuation (1974, 1980).

We are coming to the gestation of post-cognitivism. It was in 1977 that cognitive sciences were consolidated as a science with the creation of the *Cognitive Science Society* and the journal *Cognitive Science*. J. Fodor's (1975) proposal had a great impact. In opposition to the instrumentalism and behaviourism of D. Dennett (1977), Fodor considers that the mind consists of an unlimited set of symbols and representations in the brain that are structured with a syntax and semantics exclusive to the mind (*Mentalese*). For Fodor, the whole system works by laws of causal implication and is structured in modules which separate, for example, low-level cognitive functions such as perception from high-level functions such as beliefs and desires; a neurological organisation that Felleman & van Essen (1991) will illustrate and which is still used today in neuroscience. Against this, anti-reductionism positions in philosophy of mind strikes again precisely arguing for the unbearable gap between mind and matter (a.k.a. "The Hard Problem of Consciousness"), with philosophers such as N. Block, D. Hofstadter, J. Searle or F. Jackson among many others.

In this context of analytical philosophy, the "Darwinian" perspective propagates in order to emphasise the importance of the environment and the adaptationist dynamics of brain and body for a correct characterisation of cognition. The idea of "niche construction" (Lewontin, 1983; Odling-Smee, 1988) appears, pointing to the active modification of the environment. The book *The Extended Phenotype* (1982) by R. Dawkins can also be placed in this line, as well as N. Humphrey's *The Inner Eye: social intelligence in evolution* (1986). Likewise, Winograd & Flores (1986) bring Heidegger, Gadamer and Austin in front of the cybernetics of the time to emphasise concepts such as being-in-the-world or hermeneutic circle and emphasise, in an anti-reductionist way, the importance of the interweaving of language, thought and sociability for cognition. So will Dreyfus (1990) who,

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*in the modern and contemporary period, a principle of intelligibility, not as a source of logical paradigms and criterion of true knowledge, but as a starting point of a theory of the relationships between the organism and the environment.*" (Simondon, 1964, p.19; my translation).

<sup>43</sup> Today, the implications of an autopoietic system are still being unravelled. But, for the moment, I refer to its most basic features: "Autopoiesis" refers to the organisation of living systems into networks of biochemical processes, fulfilling two fundamental conditions: (1) self-production, where the processes within the network continually regenerate the relationships among themselves, and (2) self-distinction, where the network emerges as a unique and unified entity within the realm of biochemical interactions. Hence, an autopoietic system is both materially self-producing and self-distinguishing (Maturana & Varela, 1980).

among other authors, will distil Heidegger in a pragmatist key, doing the most recognised introduction of him for the panorama of philosophy of mind.

Advances in machine learning continue unabated due to the work on backpropagation learning (McClelland & Rumelhart et al. 1985). These are, for example, the "Helmholtz Machine " (Dayan et al. 1995; Dayan & Hinton 1996), as well as more embodied robotics (Brooks, 1991). In these, top-down connections contrast bottom-up signals in order to supervise the development of the generative model functioning as a perceptual "recognition model". These views include a number of well-developed proposals which all have an evolutionary emphasis, such as R. Jackendoff (1987) "Projective Mechanism", B. Baars' (1988) "Global Workspace", G. Edelman's (1989) "Neural Darwinism", W. Calvin's (1990) "Darwinian Machines" or D. Dennett's (1991) "Multiple Drafts"<sup>44</sup>. Through this bi-directional connectivism, it was realised that a set of local laws could explain cognitive processes such as vision, motor coordination or memory associations (a.k.a. "soft problems"). But since they made consciousness appear as devoid of any causal relevance, consciousness seems relegated to another plane. For example, Varela (1996, p. 331) says that to Jackendoff the "phenomenological mind" is seen as projection from a "computational mind", an epiphenomenon of an underground mechanism where all causality takes place. Thus the only conclusion he can come to is that consciousness "is not good for anything" (1987, p. 26).

With this we finally arrive at the diffuse origins of post-cognitivism, with concepts such as "embodied mind" or "enactivism" (Varela, Thompson & Rosch, 1991; influenced by phenomenology and with Buddhist overtones). The first-person experience that is impossible to symbolise is precisely the pure situated experience belonging to a context. In the same line is the critique of the Good Old-Fashioned Artificial Intelligence (Dreyfus, 1992). Finally, the "hard problem of consciousness" is explicitly presented as a discussion script for philosophy of mind (Chalmers, 1995). And this is complemented by neuropsychological studies in which the focus of observation is not on the symbolic processes of the brain, but on the active interrelation with bodily abilities and the meaning they acquire in context (as shown by Beach, 1993; Mackay, 1999; Maglio, et al., 1999; Kirsh & Maglio; 1994) in what will also be known as "extended mind" (Clark & Chalmers, 1998). What follows is already post-cognitivism, whose latter controversies are more or less characterised in §2.1.

### **Conclusion: The Waterway We Navigate**

The above exposition showed that the second half of the twentieth century in cognitive science reflected the importance of different naturalistic and pragmatic versions compared to the ones of the beginning of that century. In this second half some metaphysical questions still follow, but perhaps the main note is that

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<sup>44</sup> Obviously, for me more "Watsonian" than truly "Darwinian".

an obvious emphasis is given to the question of perception in the advances of cybernetics as well as for anti-reductionists. But, crucially what is most interesting from the second half on is that *the conception of habit that was previously outlined with behaviourism irrupts into computer science in the mid 40-50s, and gets consolidated throughout the whole cognitive discussion*. But, since this detour is over. The most important thing is: What can we say about the definition of post-cognitive according to its historical context? We need these keys to enter the analysis of the nowadays concept habit in the next chapter.

- First, it is not clear that post-cognitivism can be defined as anti-computationalism. First of all, because this position has had different contexts, in particular before and after 1940-50. Before this date, a defining characteristic is that anti-computationalism is marked by the inclusion of the concept of habit in its theories. But after this date, due to the "naturalization of computationalism" and the importance for cybernetics of adaptationism and pragmatism, *a particular notion of habit* is also characteristic of computationalism. Moreover, after this date, precisely this particular notion of habit also permeates post-cognitivism, which separates from the importance of habits claimed by authors such as Peirce, James, Husserl or Darwin. In this sense, after the 1950s, anti-computationalism is characterised by affirming the experience arising from the inseparability of the self and its world, although something similar also occurs in cybernetics. With all this, to conclude that all post-cognitivism is anti-computationalism is difficult.

To put it quickly, of the three fundamental presuppositions of Cartesian-computationalist epistemology seems clearly rejected by post-cognitivism: nor 1) *internalism*, or the sufficiency with which the brain or mind or processing core is sufficient to process knowledge; nor 2) *representationalism*, or the idea that knowledge is information and that this describes the external state of things; neither 3) *formalism/logicism* with which information is processed, or the mechanical chaining with which information is transformed. The extent to which post-cognitivism rejects them is still a matter of debate today, as has been shown in §2.1. In short, to define post-cognitivism particularly as anti-representationalist or anti-internalist is, in some cases, to speak of how one wants it to be, not that current post-cognitivism already is.

- As have been exposed here, the existence of irreducible experiences such as spontaneity, impulses, cognition of pure qualities, sense-data of perception, etc., have never been ignored even for logicians. In an ontological sense, the proposals of the post-cognitive referents coincide in trying to provide a solution. However, avoiding *epistemological dualism* is more difficult. The anti-Cartesian defence of human cognition ends up appealing to phenomena irreducible not just to logicism, but even to computationalism, pragmatism or even to scientism in general, even if one

defends ontological reduction and naturalism in turn. As this is something present in today's post-cognitivism in an enormous range of nuances. Therefore, I find not enough justification to define post-cognitivism as an epistemological anti-dualism.

- But, in spite of all this, the concept of habit remains the central element, with the acceptance of pragmatism, phenomenology and naturalism. However, this concept has evolved. Habit was the centre of an ontological philosophy for James, Peirce, Dewey, Darwin or Husserl, among others. But this concept becomes useful with another sense for computational naturalism when it integrates the Watsonian interpretation of habit and not the Darwinian one (As will be seen, although they use the expressions "Darwinism" and "evolutionism", they only participate in "adaptationism").

So, to summarise this introduction, let me say that a particular alliance between points of interest of those early philosophers so cited by current post-cognitivism and a continuation of the naturalised-behaviourist habit is happening. This alliance is what will be examined. So to say, if I want to define post-cognitivism as *habit-centred epistemology*, should I not clarify under what conception is this concept used? What implicit normativity does this post-cognitive use of the concept imply? The quick answer is that the complexity of the concept for those philosophers of the beginning of the century has been broken down into a structure in which the habit, now mechanised and routinised, passes to a corner while other concepts and presuppositions appear that will define post-cognitivism and its normativity. This is what the next chapter is about. I will deconstruct post-cognitivism by analysing its notion of habit.

## 3. "Habit" in Post-cognitivism

### 3.0 The Use of "Habit" and the Habit-Goal Dualism

Both of these detours, that of the current discrepancies of post-cognitivism (§2.1) and that of the historical vicissitudes of its emergence (§2.2), have helped me to think that defining post-cognitivism approaches cognition as an "habit-centred epistemology" is possibly more informative than claiming that "cognition does not only happen in the head". This is somehow interesting. First, because as has already been discussed, it is difficult to offer a definition that satisfies all post-cognitivists: remember the diversity of nuances raised by the interference of representationalism, internalism or reductionism in the projects. They all agree on a cognitive- affective- motor- perceptual- socio- material- interoceptive- immunological- morphological- ...interweaving, but each proposal hardly escapes from those concepts which do not satisfy everyone. Therefore, the definition, which we call "minimal", of Newen et. al (2018), according to which "cognition does not only happen in the head", seems to me the least compromised. In this regard, this essay is adding the habit-centred feature to the definition.

The second reason why it is suggestive to talk about "habit-centred epistemology" is that for some reason this definition has hardly been used. And this intrigues me. I may be leaving a lot out, but prior to this thesis I only knew the brief, but concise, doxography on the concept of habit by Barandian & Di Paolo (2014) explicitly designed for 4E cognition. Then, already in my documentation phase I came across the recently published work of Legg & Reynolds (2022), who reinforced my intuitions and to whom I owe the concept "habit-centred epistemology". And it is already busy in writing, that a handbook on habit from Cambridge University Press (2021)<sup>45</sup> appears published in paperback edition, where most of its contributors are committed to this understanding of 4E based on a philosophy of habit. However, the concept of habit is still present in cognitive sciences and post-cognitivism. Or so we think. Precisely in the latter work, a graph is highlighted that shows that from 1900 to 2000, the frequency of use of the word "habit" in Google Books texts has halved (Testa & Caruana, 2021, p. 9). Moreover, just in the 1950s, the word habit is overtaken by the upward trend in the academic use of the words "representation" and "*goal-directedness*", which before this date were less frequent than the word habit. In line with what I pointed out in §2.2, in these years habit comes to be understood academically, mainly due to its use in computer science, as a process which, while indispensable for cognition, is characterised by being a mechanised counterpart of other cognitive processes.

This appreciated essay by Testa & Caruana, ends its analysis around the year 2008, showing that from 2000 to 2008 the concept of habit begins a new upward

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<sup>45</sup> I refer to Caruana & Testa's (Eds.) (2021), physical version (2022).

trend (p. 9). I suggest that in the present of post-cognitivism, this is not so clear. To their review, I would like to add that in the almost one thousand pages of the *Oxford Handbook of 4E cognition*, the word "habit"/s appears only *four* times: three of them characterised as an unconscious process (p. 100, p. 583, p. 778), the remaining one, moreover, pointing it is an adaptive outcome (p. 88)<sup>46</sup>. Moreover, the concept *does not* appear in texts that I consider key to current post-cognitivism such as Badcock et. al (2019), Bruineberg & Rietveld (2014), Choudhury, Nagel & Slaby (2009), Ciaunica & Levin (2022), Di Paolo & De Jaegher (2012), Fabry (2020), Friston (2010), Gallagher & Allen (2018), Hohwy (2013), Kirchhoff & Froese (2017), Laland et al. (2016), Malafouris (2019), Menary (2014, 2015), Mühlhoff (2015), Seth (2015), Stephan & Walter (2020).

On the other hand, this picture is complemented by looking at the context in which the concept is used but the term appears only *one to three times*, and is considered as a result and as an influence on cognition alongside bodily skills, drills, costumes, conventions, norms, preferences, physical conditions or sensory habituation: Aagaard (2021), Anderson (2016), Bruineberg, et. al (2018); Butz et al. (2021), Clark (2013, 2015), Colombetti (2014), Colombetti & Krueger (2015), Coninx & Stephan (2021), Fabry (2015), Gallagher (2017), Gallagher & Bower (2014), Gallagher, Hutto, Slaby & Cole (2013), Heras-Escribano (2019), Hutto (2017), Kirchhoff (2015), Kiverstein & Rietveld (2015), Krueger & Szanto (2016), Noë (2009), Slaby (2016), Slaby, Mühlhoff & Wüschner (2019), Sterelny (2010), van Dijk & Rietveld (2017). In short, if the concept is used, it is used as an acquired rigid tendency to act in a certain way due to the repetition of a set of actions until it becomes almost or absolutely involuntary, *à la Watsoniana*. So, as opposed to Testa & Caruana (2021), I suggest that, firstly, the concept of habit is not used as much as we thought it was and that, secondly, if it is used, it is respecting its mechanistic and behaviourist, following the history exposed in §2.2.<sup>47</sup>

If it has that poor explicit role it is because, in fact, there is a widespread distinction in contemporary literature between processes that are cognitively search-based and flexible in contrast to habits which would be inflexible. This distinction is inherited from the 1950s and still applied in machine learning (Sutton & Barto, 1998; Gelly & Silver, 2011; Maisto, Friston & Pezzulo, 2019). I call this *the habit-goal dualism*. According to this, habits are a posterior form of optimisation strategy, a mechanisation, of other previous deliberate cognitive processes (Balleine & Dickinson, 1998; Dolan & Dayan, 2013). But "this mechanism is completely unknown" (Maisto et al., 2019, p. 299) even when the authors use this distinction. So, generally, habit is understood as *a residue* of the cognition-environment relation that *passively conditions to repeat the same thing*,

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<sup>46</sup>I also considered terms such as "inhabiting", "habitual" or "habituation", which appear in the text corroborating the general idea presented here.

<sup>47</sup>There is a big exception made up of four post-cognitivist authors who I consider to have developed an explicit habit-based epistemology: H. Dreyfus, E. Di Paolo, C. Legg, I. von Maur. In the second part of the thesis, they will be in dialogue with Deleuze's *Habitus*.

i.e., roughly speaking, it is mainly understood as being the mechanical ("naturalised") counterpart of the *other* intellectual *and volitional* cognition. All in all, the notion of organic habit seems to be an extrapolation of the perceptual phenomenon of sensory habituation.

This parallels the scientific landscape. Recent studies on habit also use its mechanical and behaviourist meaning and show that these habitual and automated behaviours correlate with increased activation of the dorsolateral striatum region (DLS), that receives input from sensorimotor and premotor cortices, in contrast to a neighbouring region, the dorsomedial striatum region (DMS), that receives input from prefrontal cortex, which is activated with goal-directed activities. Their activation shows an inverse correlation (de Wit, et al., 2018; de Wit, 2018; Gremel & Costa, 2013; O'Hare et al., 2018). However, despite this distinction, more recent studies question whether this distinction acts on what we call habitus (Vandaele et. al, 2019; Smith & Graybiel, 2022). While, during early training, the nature of sequence-related activity was markedly predominant in DLS rather than in DMS, these were similar to each other after extended training, with a balanced distribution of task-related inhibition and excitation in both regions (Vandaele et. al, 2019). Further, many sequence-related firing patterns on DLS appeared to reflect stimulus attributes (attentional processes) rather than motor initiation. Moreover, both regions act in concert when a series of actions are performed with great regularity after extended training (Vandaele et. al, 2019). So it might not make much sense to keep distinguishing the habit this way. "Habits are multifaceted, not simple stimulus-response behaviours" (Smith & Graybiel, 2022, p. 40). This also complicates the well-known relationship of obsessions or accentuated bad habits with some behavioural disorders (such as addictions, obsessive-compulsive disorder and autism-spectrum disorders), as these are too varied and all involve many connections with other cortical areas (Smith & Graybiel, 2022).<sup>48</sup>

Now, if I myself say that the concept is not used, or is used in its mechanical sense, why do I insist on characterising post-cognitivism as an epistemology of habits? Let's say that I also find it paradoxical that, although it is almost ubiquitous to find in post-cognitivist texts introductions or epigraphs dedicated to *philosophers of habit* as, e.g., Peirce, Dewey, James, Heidegger or Merleau-Ponty, nevertheless, his central concept is not explicitly being used. The answer I gave to this is that *we are faced with a drift from the philosophy of habit*. In this sense, the conclusions of the previous archaeology (§2.2) on the drift of the concept of habit in philosophy of the mind take special interest for the present analysis. If in those canonical philosophers habits were an ontological

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<sup>48</sup> In short, "*Many terms in neuroscience are inherited from folk psychology [...] These postulated terms are assumed to be entities with definable boundaries, and within this framework, the goal of neuroscience is to find homes and mechanisms for these terms in the brain with corresponding boundaries (I called this "the correlational approach")*" (Buszáki, 2020, p. 1). Hence, I propose to revise this concept of habit, although by means of reusing the complexity that it had in its previous conception.



instance, where mind and body, chance and determinism, creativity and conservation were united, now these questions have been naturalised. *The main thesis here is that the concept of habit has come to occupy an equally fundamental but more concrete, more discreet place in a conceptual structure in which some neologism stands out at the centre of each proposal. However, the thesis follows, in the other corners of this theoretical structure, there are other concepts that are still vicissitudes of those metaphysical concerns that were discussed by previous philosophers of habit.* In the present corners reside concepts such as adaptation, attunement, equilibrium, goal-directedness, motivation, plasticity, task-relevance and self-reference... whose emphasis concretise *the normativity of post-cognitivism regarding what cognition is.* In fact, if I mentioned earlier the only *four* occurrences of the concept of habit in the OH4E, "dis/equilibrium" appears about *seventy*, "motivation/s" about *one-hundred-and-twenty*, "goal/s" about one *hundred-and-fifty* and "plasticity" about *two-hundred*<sup>49</sup>.

Having said all this, what this chapter aims to do is the following. It wants to show that the notion of habit used equals residuality and great inflexibility and it occupies an explicitly tiny part in their theories. It wants to show that this habit, even so, is fundamental to them, so they somehow develop a philosophy of habit. Now, this routinised habit, however, is coordinated with other presuppositions and a particular kind of epistemology. This epistemology will be developed in the discussions. Moving on to Chp. 4, devoted to Deleuze, we will see that Deleuze is dealing with many of the post-cognitivist problematics, including the most current ones, and that his concept of habit is not subject to a mechanistic version, so he does not share much of the normativity of current post-cognitivist epistemology.

To sum up, if the main thesis of Chp. 2 was to show that post-cognitivism is characterised by giving a central role to habits as a cognitive mechanism and that the conception of habits shifts from the mid-twentieth century towards a more behaviourist position; now, the main thesis of Chp.3 is to justify that habit is highly implicit in all post-cognitivism and in the 4E and that this relevance to habits *must* be implicit because although post-cognitivism aims to dilute many dualisms, it fundamentally drags along *a habit-goal dualism*. We will see that this is translated and put into practice through two normativities: an *epistemology of adjustment* and an *epistemology of prediction*, i.e., cognition tends towards adjustment and cognition tends towards prediction.

The undertaking is complicated, knowing that my greatest enemy is to generalise the proposals. Thus, the chapter is structured in two sections, in each of them, there is first a presentation of a group of authors in which habitus is analysed, and then there is a general discussion. First (§3.1) I will deal with some authors, A. Noë, D. Hutto, M. Heras-Escribano, who hardly use the concept

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<sup>49</sup>I count meanings referring to the system: "goal (of the system/organism)", "motivation (of the system/organism).... Variations such as "motivational" or "motivationally" have also been included.

of habit, and if they do so, they do it from a mechanistic and unconscious conception. With this I will begin to address the philosophical relevance given to *attunement*, *harmonical* and *task-relevant* commitments in the study of cognition. This will give me key points so that the variety of not-so-explicit post-cognitivist contributions, far from playing against me, show their common invariants. In doing so, (§3.2) I will extend the discussion of the presuppositions of what motivates engagement and coordination (i.e. equilibrium and goal-directedness) and see their relation to the circumstances of current philosophy and cognitive science: in particular, how they relate to the computational proposal of *predictive mind* and to the *free energy principle* through A. Clark, K. Friston, S. Gallagher and J. Bruineberg, all in all, promotes an epistemology of prediction. Remarkably, throughout the whole chapter, first characteristics of a Deleuzian definition of habit will appear.

### 3.1 Contemporary Philosophy of Habit: Without Making It Explicit

In this subsection I will exemplify that the concept of habit remains fundamental in the drift of post-cognitivism though not much mentioned. First I will exemplify its importance through the analysis of three figures that are even antagonistic in terms of the representationalist and subjectivist stance. These are A. Noë, D. Hutto and M. Heras-Escribano. I have listed them above in accordance with their restricted use of the concept of habit. However, I choose to analyse them as representative since exceptionally they refer to the concept of habit more than three times in their works, which facilitates the exposition of their notion. This depiction will allow me to analyse that far from the habit-epistemology of the firsts philosophers of habit that condensed several concepts, now the concept of habit responds to the habit-goal dualism. The mechanical habit is at the basis for an *epistemology of attunement* so much present in post-cognitivism. I will discuss what this means and the presuppositions it brings for conceiving cognition that can be extrapolated to other post-cognitive philosophers for whom the concept of habit is even less used despite being fundamental.

#### **(Case 1) A. Noë: Habit and Sensorimotor Perception**

Starting with A. Noë allows us to perfectly link several of the themes that appeared at the end of the historical detour of the previous chapter: an emphasis on the perceptual question, a dualistic epistemology and a conception of habit with mechanistic overtones. To contextualise, Noë is the only philosopher of those I have cited whose work is previous to a ten-year time frame. Contrary to the others, he devotes one of the last chapters of his book *Out of our heads* (2009) to habit. In this book, he is concerned with the question of "consciousness" (or, rather, "experience", "the fact that the world "shows up" for us in perception" (p. 8)). He defends the idea that consciousness is *something that is done*, not something that happens inside our heads (p. 24). The topic of consciousness and

its neuronal correlates is characteristic of that decade in cognitive science and, arguably, Noë's is one of the few post-cognitivist approaches to that end. Specifically, for Noë, consciousness is realised through the union of the perceptual and the motor while this union is actively involved in the environment (O'Regan & Noë, 2001; Noë, 2004). Phenomenal experience is produced by the *know-how* of an agent while moving through the environment, not by any detached representation made out of a cognitive process. Perceptual *content* is thus constrained by sensorimotor skills (Noë, 2004). Sensory-motor swarms build phenomenal content.

It is in this context of phenomenological concern, that Noë challenges cybernetics in a short chapter by saying that "a better goal would be to make robots with habits" (Noë, 2009, p. 98)<sup>50</sup>. However, for Noë, habits, in the style of *folk psychology*, are an effect of the repeated intertwining of motor practices and the environment that, used in the behavioural plane, constitutes the basis for routines. For Noë "habitual action is thoughtless and uncontrolled; it is, in that sense, involuntary and brute" (p. 117). Relevantly, adaptive flexibility is not dependent on habit. Instead, adaptation is delegated to intellectual perceptual-motor loops reflected in neural plasticity which, in turn, produce changes in qualitative experience (Hurley & Noë, 2003; Noë, 2009). But habits are not these *sensorimotor loops*.

But even so, he insists that being habit-free would be if not impossible, then undesirable. His arguments are threefold. The first argument is that habits of thought and behaviour are needed as a foundation for developing both motor and intellectual skills. The second argument is that habits exist and must exist since they are the residual outcome of cognitive achievements. Finally, his third argument is that without habits "each day would be like one's first day in an unfamiliar country" (Noë, 2009, p. 119). From all three arguments we see the ontological priority he gave to the practical and pre-reflexive plane. However, far from Heidegger or Merleau-Ponty (Dreyfus, 1990, 2014), Noë considers that plane exclusively mechanical, robust and grounding. As seen in the other two arguments, he emphasises habit as a mere static repository. For him, habit would be a residue on which we rely but leaving the other *separate* faculties to play an active role in cognitive growth. Moreover, against the third of his arguments, one of the main factors of current computation consists precisely in reinforced learning, which, at the explanatory level, is the mechanism through which an artificial system builds itself a knowledge (a generative model) that serves precisely to avoid starting from scratch in each act. Let's say that a "robot" has just the habit, of which Noë speaks.

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<sup>50</sup> This idea had already been expressed by Di Paolo (2003), who, as I will discuss in §4.2, is one of the four post-cognitivist authors (Dreyfus and, recently, Legg and von Maur) who I believe have insisted on the fundamentals of habitus without a mechanistic view. "We may invest our robots not with *life*, but with the mechanisms for acquiring *a way of life*, that is, with habits. This may be enough for them to generate a natural intentionality, [...] [based] on the conservation of 'one' way of life." (Di Paolo, 2003, p. 31)

All in all, two things deserve to be highlighted about Noë. The first is that, although Noë participates in the mechanistic-behavioural turn of the philosophy of habit of the 1950s, concepts such as irreducible qualitative experience or plasticity appear in his theory, i.e. a dualist epistemology that were already part of the mind of the 20th century philosopher, but which at that time were "integrated" in the concept of habit. In front of these, in Noë we find an emphasis on other "intelligent" or "volitional" faculties that will do the adaptive and creative job.

But the second conclusion is that in Noë, even ambiguously or even contrary to his explicit definitions of habit, it can be tangentially observed that *habit is the process of deepening*. Because Noë himself, in another place comments that the novice differs from the expert in that "the expert's performance, it has been shown, deteriorates if he focuses on the mechanics of the task. [...] The expert's performance flows from an engagement with the larger activity that is *necessarily unavailable to the novice*." (p. 100). That is, she who habituates focuses on something hitherto invisible. This is a first aspect of the reinterpretation of habit acknowledged through the present thesis. By repeating itself, habit allows us to move in and out, to experience new planes or to specialise. I will come to this point later on. The important thing to note here is that Noë points out the importance of habits, but from its cementing, residual and mechanical role.

### **(Case 2) D. Hutto: Habit and Adaptation**

This same restrictive conception of habit, while fundamental, can also be seen in Hutto and Heras-Escribano. In their case, habit is at the basis of a relational biological cognition, of a relational social one, and even of a justification of agency. All in all, that Noë got into the hard problem of consciousness, even if it was to denounce the myopia of pretending to find the neuronal correlates of consciousness without observing the general dynamics of the body and the environment, was not to the liking of all enactivists; being Hutto and Heras-Escribano among these. Specially, Hutto questions the need to appeal to mental contents, even to refer to *practical* knowledge, let alone the concept of "representation" (Hutto & Myin, 2013, p. 25); concepts that Noë could hardly resist when trying to defend the leap between the neural and the experiential. In general, their work has consisted in radicalising enactivism: taking it to its radical anti-representationalism (Hutto & Myin, 2013, 2017) or emphasising the anti-internalism and direct perception of Gibson's theory of *affordances* (Heras-Escribano & Pinedo, 2016; Heras-Escribano, 2019). But, to put it quickly, both have not considered it potentially useful to delve philosophically into habit, as it is equated with drills and is considered repetitive and unconscious (Heras-Escribano & Pinedo, 2016, p. 578; Hutto & Myin, 2017, p. 76). Contrary to Noë, they don't even explicitly address the importance of the habit, but it is still important as I will show.

As I said, their aim has been to defend an enactivism free of contentful mental states. Hutto, and Heras-Escribano (Heras-Escribano, 2019, p. 147-162), mean by "content" not that which fills the experience, that which colours it, gives it smell, gives it intensity or thickness; but is content in the logicist-analytical sense, that is, the content of truth, of reference, of logical implication, i.e., in comparison to a mere non-informative perception. In other words, Hutto radicalised enactivism by rejecting "positing contents that are acquired and transformed in order to create representations that then inform and guide what an organism does or experiences." (Hutto & Myin, 2013, p. x). They want to show that there is no need for content either in intentional acts (agency) or in perceptual experience. Although they do not devote themselves to explaining how this content-free or content-less phenomenological experience arises (Hutto & Myin, 2013; Heras-Escribano, 2019, p. 147). As Hutto makes explicit, his post-cognitivist approach deals with "basic minds", understood as simple adaptive organisms "dynamically unfolding, situated embodied interactions and engagements with worldly offerings" (Hutto & Myin, 2013, p. xi). So to this end, the problem of content has been restricted, namely, it refers to basic minds and it does not deliberately talk about phenomenological content. According to them, it is necessary to expose that *basic minds* do not need representations or computations of any kind. This is the focus of its work. Whether or not this serves to extrapolate to other "non-basic" entities remains in suspense.

Broadly speaking, for Hutto the main way to extrapolate insights from the cognition of basic minds to human cognitive agents is to look at what kind of information (non-representationalist and non-contentful) these basic agents use. So, once experiential issues have been removed from the focus of concern, both authors base information on the *adaptationist* perspective, *where embodied cognition achieves its survival by coordinating with the environment through mechanisms that the agent evolutionarily incorporates*. No mental state referring to truth, implication or whatever reference is needed. A perception that evaluates and gives meaning to the environment, as enactivism holds, and the improvement of these evaluations through time, do the big job.

From there, radical enactivism focuses on the information that emerges, without further processing, from the mere fact that two facts co-occur: that is called *covariant information*. Although the idea of covariation was already a naturalistic idea (Dretske 1981, 1988; Millikan, 2005), Hutto's conception of covariation does not have to pass through logical representations or contents, but acts in the "*biosemiotics*" or "*teleosemiotics*" of organisms (Hutto & Myin, 2013; Hutto, 2017). A perfect summary of Hutto's exposition of covariance is in Heras-Escribano: "Basic minds are directed toward states of affairs [...] but they do not transform, gather, and/or consume this covariant information in order to contentful represent anything: *The sensorimotor history of interactions of organisms is sufficient to account for how they are cognitively engaged with their environment* (Heras-Escribano, 2019, p. 152, my emphasis). We could say that for

Hutto, natural selection (phylogeny) and operant conditioning (during ontogeny) would offer, if not all, the major explanation. For Hutto, this is *to attune, to cope, to coordinate, to flow with the environment* (Hutto & Myin, 2013).

Once again, something curious happens regarding the concept of habit. Without going into an explicit philosophy of habit, in Hutto, in this and other texts, there are specific mentions to the idea of habit, as a condensation of the history of interactions and practical and biological skills. According to Hutto, these will be the processes *that best help to explain knowledge* (Hutto & Myin, 2013, p. 17, p. 47). Similar to Noë, in spite of being mechanised, residual and behavioural, habits are the perfect adaptive contentless attunement mechanism, i.e., the perfect knowledge for *basic minds*.

But I can add another example from Hutto. For it is recently that Hutto & Robertson (2021)<sup>51</sup> finally bring the concept of habit to the centre of their essay. Particularly, they bring it with the aim of arguing for a theory of agency from radical enactivism, that is, a theory that explains the possibility of intentionality but, of course, without introducing mental contents in such intentions. To put it quickly, their model goes back to Anscombe (1957) in that it is sufficient that "to act intentionally or to act for a reason an agent must be capable of giving an account of what they are doing and why". Hutto & Robertson (2021, p. 215) understand that explanations cannot always be given: there are unconscious or unintentional doings and there are even moments when we think but some stimulus bursts in. For all this the only explanation that exists, they say, is to claim "*I have done it out of habit*". Once it is acknowledged that habit refers to biological as well as social attunement, this answer becomes particularly relevant for an agency theory; that is, the conscious or unconscious *will of the organism*. For habit, in turn, allows us to refer to the (more or less vague) reasons why we have that habit, as Anscombe wanted, even if we cannot explain the habit in detail. Thus, habit implies a very basic form of responsibility: *habit is the most basic index of agency*.

All in all, in Hutto there is an automatistic conception of habit at the centre of his philosophy that allows him a non-contentful biologic-adaptive theory and a theory of agency.

### **(Case 3) M. Heras-Escribano: Habit and Social Affordances**

Finally, let us see Heras-Escribano. Concretely, Heras-Escribano follows J.J. Gibson so prefers to speak of *ecological information* to get rid of any representationalist and internalist loophole that information processing may have. Ecological information informs about the *affordances* according to the agent's dispositions. It is non-independent information, therefore it is not, as in the classical sense, transmitted from A to B, instead, it is relational and situated information. In this sense, this information does not properly belong to the

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<sup>51</sup> Precisely as contributors to Testa & Caruana's (2021) volume.

subject; it is still external information. Heras-Escribano assures us that ecological information is perfectly compatible with radical enactivism or Hutto's approach (Heras-Escribano, 2019, p. 161). But what does habit do in his theory? Well, what was said for Hutto is also true for Heras-Escribano. But the concept of habit also appears at other key moments in his theory.

Heras-Escribano resorts to Dewey's ideas on habits (p. 68-70, p. 192-196) to acknowledge for the fact that the biological basis (mainly interoceptive, exteroceptive and morphological) that Hutto focuses on, does not sufficiently explain the characteristic conditioning factors of social and intersubjective interaction. Instead, *affordances* might be a better informative candidate, because their ecological information already includes the social constraints from which the cognitive agent perceives them. These constraints are included in affordances through reinforced "habits" as Dewey understood it. Because for Dewey, habits are social. Habits participate in *organic coordinations* of agents, thus, habits apply beyond basic minds to agents immersed in psychological, cultural and political constraints (Dewey, 1910).

Hence, influenced by neo-pragmatists such as R. Brandom or Wittgenstein, Heras-Escribano broadens the adaptationist question towards normativities arising from social and rational exchange. With them, ecological information can in no way be constituted only on the basis of the demands of physical dispositions, but social factors also intervene which also function by permitting, sanctioning or reinforcing certain actions and behaviours in the normative domain. The result of this process, according to Heras-Escribano, in its unconscious modality, is incorporated as social habits that shaped how we perceive affordances. To sum up, Heras-Escribano expands his theory to a social dimension, thanks to habit. However, he understands habits as an unconscious and residual, but conditioning, part of our action.

Said that, I will move to a discussion of all I've exemplified so far. But before that, in Heras-Escribano we observe a final reflection (in my view paradoxical for his proposal) that I would like to share for being related to my habit proposal. It is the argument that Heras-Escribano directs against Chemero & Kauffer (2016) who approach *affordances* from dynamical systems theory. The reason for what I share this is because I find his argument perfectly applicable also to radical enactivism, but also could resonate to many others (like Noë or Hutto, and the ones mentioned in a moment). The thing is that Heras-Escribano criticises Chemero & Kauffer's for, although emphasising dynamic coordinations as non-subjectivist processes of agent-world adjustment, they only take cognition as in charge of *resolving specific and present tasks*. As againsts Hutto, adding the social dimension helps to overcome basic and simplistic encounters:

*"Restricting the influence of the environment solely to the task-relevant elements is not a plausible depiction of our behaviour in those contexts. [...] Our environment includes not only physical, but also social aspects*

*that may alter or restrict, as well as finish, a specific task. We are really flexible organisms because, although we focus on particular tasks, we are also aware of the possibilities that come with the presence of certain aspects of our surroundings that go beyond the very task we are dealing with (take, e.g., a situation in which it is preferable to satisfy a social norm or to react to an environmental threat that drastically alters or even finishes the performance of a task)" (Heras-Escribano, 2019, p. 123-124, my emphasis).*

And here again, I take advantage of this analysis to tangentially reread a second characteristic for the concept of habit that I want to reformulate. The habit I will propose is partially suggested by Heras-Escribano. Habit implies various "levels", i.e. is a condensation of the organic and is reification of socially shaped phenomena. However, the big difference that I will develop is that in the study of cognition and habit is not a question of expanding the levels/dimensions/variables to be taken into account in task-specific encounters (p.e. adding the variables of *the* social dimension when moving from basic biological minds), nor is it even a relation of conditioning that is exercised between the various emerging hierarchical levels, but rather a relation of interference between levels. Indeed, *habit can be that vehicle that leads us from an externalist to an immanentist approach to the relations between systems* (along the lines of Mühlhoff, 2015). As will be developed below, instead of observing habit as a residue of the co-ordinations of some existing systems attending to the different contingencies that oppose at the different emerging levels, from an immanent perspective habit incorporates and at the same time deepens the levels that are a consequence of it.

## **Epistemology of Attunement**

### **(Discussion 1) Attunement, Loops and Reciprocity**

From what has been said so far, the conclusion is that in these post-cognitivist authors (Noë, Hutto and Heras-Escribano) we can see the fundamental role that habits have in their theories about cognition, despite the fact that they have not developed their proposals explicitly around habits, but on the concepts of "sensorimotor contingencies", "covariant information" or "affordances". And remarkably, when they refer to habits it is in its folk, mechanistic and behaviourist sense. The hypothesis held here is that these two conclusions extend to most of the post-cognitivist authors who do not use the concept of habit or use it very little.

I have listed some of their works at the beginning of this chapter. These are proposals that revolve around terms such as *alignment* (Gallagher & Allen, 2018), *distributed cognition* (Hutchins, 1995; Henrich, 2004ab; De Jaegher, Di Paolo, Gallagher, 2010), *enculturation* (Menary, 2018; Kirchhoff & Froese, 2017),



*material engagement* (Malafouris, 2019), *mind invasion* (Slaby, 2016), *mindshaping* (Zawidzki, 2013, 2018), *niche construction* (Sterelny, 2010), *optimal grip* (Bruineberg & Rietveld, 2014; Bruineberg et al., 2018; Rietveld et al., 2018), *participatory sense-making* (De Jaegher & Di Paolo, 2007; Di Paolo, Cuffari & De Jaegher, 2018), *sensorimotor mastery* (Di Paolo et al., 2017; Di Paolo, 2021), or *skillful coping* (Dreyfus, 2002a, 2014). In short, these are philosophies that could be conceived either as focused on *user-resource interactions* or on *strongly coupled interactions* (Slaby, 2016; Stephan & Walter, 2020).

What happens is that upon closer examination of the aforementioned set of concepts, one easily realises that they are the cornerstone of solid postcognitive proposals whose cognitive approach is based on the systematic reciprocity between organism and world. Due to their approach, then, the *non-explicit* mention of habits, or its little mention with mechanistic and routine connotations, seems strange to me. Because, despite the little or no reference they make to the concept of habit, nevertheless, the idea of habit, and often also of *habituating* or *inhabiting*, (whether in socio-cultural action or in bio-morphological processes, or in both at the same time) plays an extremely fundamental role in their cognitive proposals. All in all, they have in common 1) the fact that they base their cognitive approach on the systematic reciprocity between organism and world; 2) that they do not *explicitly* place a central role to habits, but crucially, 3) as was the case with Noë, Hutto, Heras-Escribano, they implicitly hold that habits are the mechanic necessary counterpart of cognition, *a necessary residue of agents interactions*: one half of the "habit-goal" dualism of cognition. But why do these three aspects come together?

It would have been very long to analyse the concept of habit in each of the proposals I am referring to. It is something I would be willing to do. However, for the time being, since these proposals do leave narrow open flanks where habit can be dealt with, as everything happens implicitly, I opted to expose Noë, Hutto and Heras-Escribano as particularly representative. The fact that these three authors differ in the degree of representationalism and subjectivism helps to make visible the omnipresence of their points in common. For maybe, that habit holds phenomenological forms of experience (Noë, 2004, 2009), or that habit can justify agency based on intentional act theory (Hutto & Robertson, 2021), can be more refined consequences of the importance and presence of habit philosophically. *But that habits and habituated practices appear as much at the inflexible basis of the sociocultural turn on cognition as at the basis of the behavioural-biological approach, as Hutto and Heras-Escribano clearly represents, illustrates the omnipresent tone for the authors mentioned above.* And I argue that this conception of habit is based, in turn, in other presuppositions common to the different aforementioned proposals.

The first basic and common aspect that we find in post-cognitivism, beyond the fact that cognition does not merely happen in the head, is the dynamic mechanism in *loops* with which the agent acquires knowledge. In fact, the

cognitive processes they expose are studied exclusively as processes of cognitive (and affective) loops of *attunement*. This means that the epistemology of cognitive subjects is considered to be exclusively aimed at fulfilling the function of adjustment. *This “epistemology of attunement”, which replaces the representationalist epistemology based on the correspondence between idea and object, has been present since the beginnings of contemporary post-cognitivism.*

M. Wheeler, for example, earlier expounded that "embodied-embedded cognitive science," as opposed to "orthodox cognitive science," considers that *intelligent* cognition was "a suite of fluid and flexible real-time adaptive responses to incoming sensory stimuli" (2005, p. 12). The authors here mentioned, through their particular habit-based epistemology, conceive this “intelligent cognition” by observing the dynamics of adjustment manifested in several levels of organic adaptation. There, habit plays the grounding mechanical and optimised cognitive role. These levels include interoception and proprioception (Badcock, 2019; Barrett, 2018; Bruineberg, 2018 et al.; Clark, 2015; Colombetti, 2017; Damasio & Carvahlo, 2013; Dreyfus, 2014; Di Paolo, 2021; Friston, 2010; Gallagher & Aguda, 2020; Rietveld et al., 2018; Varela, Thompson & Rosch, 1991), exteroception (Clark, 2015; Friston, 2012; Noë, 2009), as well as in the attunement dynamics of social acts and social norms (Bruineberg & Rietveld, 2014; Kirchhoff & Froese, 2017; Heras-Escribano, 2019; Menary, 2015; Slaby, 2016; Zawidzki, 2018). Thus, omnipresence of the ideas of *loop* and *attunement* also define post-cognitivism beyond the idea that cognition does not only happen in the head.

We transform the environment and the environment transforms us. It is a never-ending dynamic of comings and goings that adjusts our framework of possible actions as the world adjusts to the actions of its inhabitants. Hutto, Noë and Heras-Escribano illustrated that habits are the process that best explains the knowledge of biological dynamics of adjustment and is the process through which social dynamics solidify. In this sense, the incorporation of the appropriate use of rules into affordances (Heras-Escribano, 2019) not only applies to institutional norms. The same loop dynamic is implemented for almost any kind of socioculturally shaped shared phenomenon, such as the use of mathematics or linguistic symbols (Menary, 2010, Fabry, 2015). But also for intersubjectively arranging physical elements (organic or artificial) and/or other cognitive agents in a particular niche both in a physical and symbolical sense (Colombetti & Krueger, 2015; De Jaegher & Di Paolo, 2007; Heras-Escribano & Pinedo, 2016; Hutchins, 1995; Malafouris, 2018; Slaby, 2016; Zadwinski, 2013). After all, Heras-Escribano's (2019) appeal to Dewey's idea of habit is an appeal to the cultural and political character of the subject. The subject is a subjectivity in transformation shaped by the environmental constraints of the cognitive niche (Gallagher & Allen, 2016, p. 2638; Heras-Escribano & Pinedo, 2016; Slaby, 2016, p. 6-7). Nonetheless, the grounding function of habituation or the way of inhabiting space is central to these authors.

But these processes of habituation are treated as *an extrapolation of the perceptual phenomenon of sensory habituation*: in these post-cognitivism habits are exclusively conceived as a petrified residue of the interactions; as the shaped result that mechanically shapes the environment in return. The agent-agent or agent-environment relationship, works through adjusting/moulding their needs until optimal points of perfect synchrony or a fluid dynamic of exchange are achieved. It is a process of equilibrium. Habits (habituation) are dedicated to this process of routinisation and conservation. *In other terms, for their proposals, cognition must include an incorporated mechanised residue of the “equilibrium” achieved by “the invisible hand” of social dialectics* (Heras-Escribano, 2019; Sterelny, 2018; Slaby, 2016; von Maur, 2021; Zawidzki, 2018). It is a conception that can indistinctly speak of "dialectics" or, in cybernetic terms, of "loops", for in essence, it is a trend that equates equilibrium with optimization; it is an *economic* trend. That is the first (implicit) habit-based epistemology whose approach to explaining behaviour and cognition begins with and seeks an epistemology of attunement.

To sum up, the first preposition underneath their particular habit-based epistemology is that of the loop mechanism of attunement as the basis of cognition. This is supported by a habit understood as a mechanical and routinized reification of the history of interactions. But in fact, I have shown that habit can be conceived in another way (see §2.2), for example, surprisingly for its philosophical references. For James, Peirce, Husserl, Dewey or Darwin, the inclination towards new strategies, the inclination to chance, impulses, mutation or motivations beyond survival were inseparable from habitual practices. For these philosophers, coordination, grip and attunement was important for an adaptive behaviour but, so to speak, it was only half the story of what constituted habit and cognition. Yes, it is true that we can see in them what are now metaphysical issues, but what I would like to show is that today we are not exempt from other normativities, emphases and presuppositions. In this sense, cognition's over-focus on coupling and grip is a more contemporary vice than it was. But let's look at more presuppositions that define the epistemology of attunement, namely, conceiving cognition through the lens of adaptationism and seeking task-relevant and harmonical engagements.

## **(Discussion 2) Adaptationism**

Another example of post-cognitivism's fixation on studying cognition only in its adjustment and fit-seeking function can be found in its evolutionary conceptions. First of all, for post-cognitivism it is almost an unquestionable presupposition that any cognitive phenomena under study is a product of natural selection. This perhaps restricts the scope of the phenomena studied, but the truth is that this conception applies beyond aspects of biological self-regulation towards social, cultural and anthropological products (Di Paolo, Cuffari & De Jaegher 2018; Gallagher & Allen, 2018; Heras-Escribano, 2019; Kirchhoff, 2015). The narrative is that current human cognition is tied to particular human-resources structures

(physical, symbolic, or other agents) that have been evolutionarily selected in the past for survival and are not an impediment today (Laland et al., 2016; Sterelny, 2018). Thus, we are constantly improving the configuration of these structures/capabilities. This improvement is called the "ratchet effect" (Tomasello, 1999; Zawidzki, 2018). In other words, from the epistemology of attunement it follows that the world we inhabit is the result of the balance achieved by all its components, either by transformation of these or by imposition of some on others. The result is always the scaffold for future challenges.

That seems right, but my point is that it is accurate to point out that cooperation and coordination happens inside our organism equally as in the environmental/social domain, but another thing is to attend just to these coordinations and to assume that optimal cooperation is the  *motive* for cognition. *It is one thing to see in retrospect this coordination as a contributing factor and another as the present teleology ("the goal") of any cognitive and agential process.* Unsurprisingly, from the emphasis of post-cognitivism, one may end up treating this cooperative motivation as having passed the evolutionary filter and been selected (Bruineberg et al., 2018; Di Paolo et al., 2017; Fabry, 2015; Zawidzki, 2013, 2018). But this last stance, which is easy to slip into, is far from clear. As I will discuss in the next section (§3.2), *the motivational aspect, although at its core, is an unresolved question for post-cognitivism.* All in all, what we find is perhaps even a confusion between evolutionary learning and plastic within-lifetime learning.

More specifically, I believe that the particular flaw in post-cognitivism is its adoption of an *adaptationist* approach. "Adaptationism" consists in emphasising only part of the framework of natural selection. Specifically, adaptationism suggests that 1) everything that exists is the product of an agent's successful past adaptation to the environment or to other agents 2) and that only that which adapts will survive in the future. This is an evolutionary approach that is divorced from the whole theoretical framework of Darwinism, which is also based, p.e., on the principle of mutation or enhanced by *spandrels*<sup>52</sup>. One of the problems of adaptationism is that, being a retrospective reading, it tends to provide *ad hoc* explanations. Because it looks only at the present outcome, it has virtually no ability to see the past or to predict what will happen in the future. Moreover, adaptationism not only ignores the principle of mutation, but also ignores mechanisms such as genetic drift, developmental constraints, horizontal gene transfer between species, or byproducts ( i.e. secondary consequences of the evolution of other traits not directly adapted to play a role in the survival or reproduction of the organism). If we stick exclusively to the adaptive aspect of Darwinism, it is easy to come into close contact with the behavioural or operational conditioning mechanism of adaptation (a "dialectic of adaptation" in

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<sup>52</sup>A spandrel is a phenotypic trait that is a byproduct of the evolution of some other characteristic. I will come to that.

terms of optimization loops), which is more reminiscent of a Lamarckian or Watsonian adaptation mechanism than a Darwinian one.

In fact, adaptationism has been used to account for systems capable of learning and adapting without evolutionarily inherited *content*-"knowledge" (Hutto and Myin, 2013) or, in the intersubjective domain, without the evolutionary ability to represent the mental states of the other (Zawidzki, 2018). According to this view, adaptation is explained by a calibration mechanism, through which adaptation is equated to synchrony by being the result of a conditioning and reinforcing mechanism of its past (trial and error); as also defended by Barrett (2018).

Under this adaptationist, embodied and behaviourist vision, it easily follows that cognitive capacities belong to the "human cooperation syndrome" (Sterelny, 2012); an inherited biological trait. However, as said, the critical aspect of this view is that the trait under study is not only considered to be exclusively the residue of a long history of interactions, but more remarkably, it inserts in this trait a teleology that is none other than the exclusive purpose of seeking adaptive adjustment. *This vision implies that the past tells how a trait should operate in order to fulfil its designed function and, with it, it defends that it is desirable for survival when it is performed correctly.*

All in all, it is not surprising to find at the root of these authors the notion of *proper function* (Millikan, 1984, 2005). The concept of proper function defines that the particular function of an evolutionary trait we have now must be the same function it had in the past (for example, the function of the heart is to pump blood because our ancestors had a heart that pumped blood). But there are many counterexamples to this. For example, we can talk about unwanted products and effects (by-products), or we can talk about cases where a trait can have multiple effects, so that it interferes in many developmental processes. We can also talk about cases where traits survive because, despite their effect, they are scaffolds for other traits that the agents aim at. Moreover, to these counterexamples, we can mention the difficulty of defining an evolutionary trait in such rigid and linear terms, given its enormously plastic functions. Against this view, we can shift the focus from entities to systems. That is, if we can move away from identifying traits as entities with a specific function, and instead evaluate adaptation in terms of its contribution to a given system, we may find that the contribution of a same trait to another completely different system may be through a different function. Thus we will see adaptation as a messy process rather than an attunement so understood.

### **(Discussion 3) Task-relevant and Harmonical Engagements**

Apart from adaptationism, the focus of philosophy of cognitive science on a cognition that seems to *only* seek its environmental adjustment, cooperates with other related theoretical displacements. The other one has its roots in the historical displacement of the cognitive question to a question of perception, as shown in §2.2.

After Noë's linkage of perception with the question of *qualia*, subsequent theories abandon generating research proposals on these difficult "metaphysical" questions. Instead, in the current days the focus is on the sensorimotor part of cognition or on its implications in the niche arrangement. Following habit's historical drift, habit, even understood mechanically as in Noë (2009), is further distilled from its direct relation to phenomenological experience and becomes a present but passive conditioning of perception.

Turning away from questions that seem to mystify thought is a reasonable philosophical decision that I fully share. For the consequences of accepting phenomenological experience as unexplainable may be null or even encouraging a certain anti-scientism. But what does seem stranger is that the distancing from the phenomenological question implies a distancing from an analysis of the psychological richness. Let me explain.

In more detail, I am thinking of a kind of "reductionism" carried by the epistemology of attunement: that of psychology to perception, but dramatically, also that of perception to the biological and socio-cultural adjustment loop-dynamics<sup>53</sup>. Whether the "reduction" of psychology to perception is arguable, however, I do believe that much more theoretical explanation is needed about *the reduction of perception to these adjustive loops*. The outcome of this is that apart from leaving aside the question of phenomenological experience, we do miss the richness and variety of thoughts or micro-thoughts that accompany us every day in our online mode beyond mere adjustment loops.

Let me develop this further. Varela (1996), as one of the first enactivists and thus one of the theorists who has most pointed out the importance of the adaptive, homeostatic and self-individuating end (Varela, Thompson & Rosch, 1991), was already warning us of something paradoxical happening in cognitive science. He referred at the time to the "functionalist" cognitive approach of Fodor or Jackendoff, but his concern is perfectly extrapolated to any other model of cognition holding the reduction of cognition to "*task-relevant engagements*" (in line with Heras-Escribano, 2019, p. 123-124; and with von Maur, 2021). In Varela's words, "*functionalism* has been drastically preferred in cognitive science over the last 20 years, followed by the strategy to replace the link between cognition and consciousness (the most immediate one in western philosophical tradition) by the link between cognition and its corresponding functional or intentional states. [...] Thus the notion of experience becomes forcefully assimilated with that of cognitive behaviour, propositional attitude, or functional role." (1996, p. 333).

To Varela's concern, I add that the "functional role" is not necessarily linked to a representationalist epistemology, nor is it restricted to post-cognitivism that is

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<sup>53</sup>As Simondon advised: "*Finally, positivism and the progress of biology give back to perceptual problems a primordial importance, because they discover in perception, human as well as animal, a functional activity, living relationship between the organism and the environment.*" (Simondon, 1964, p. 19; my translation)

trapped in analysing user-resource interaction (Slaby, 2016), but *Varela's criticism of functionalism can also be applied to all philosophy that is only focused on cognition as a search for the maximal functional adjustment and coordination or, in other words, to task-relevant engagements*. That is, it is no longer just a problem of understanding coordination factors as motives and not as mere products, but here *I consider as functionalist those proposals that disregard the "real-world" experience of the agents and limit themselves to theorising the cognitive role only as a search for coupling*. In these cases, "the form of the Cartesian ego may have changed to something more permeable and dynamic, but its function remains the same, namely, to think and solve problems" (Aagaard, 2021, p. 171).

Along the same lines, we also find that this is applicable to the discussion on affectivity. If not always, then in many cases, even when it comes to be addressed in terms of its non-linear dynamics or from a phenomenological perspective, affectivity is *retrospectively* analysed and conjectured as a form of adjustment between agents (Gallagher, 2017; Krueger, 2014b; Rietveld et al., 2018, p. 55). It so happens that emotions themselves are seen as complex strategies of tuning to the community/environmental configuration (Griffiths & Scarantino, 2009; Slaby, 2016; Zawidzki, 2013). Once again, affective arrangements are not considered as an event but as a desired (albeit unconsciously) optimal mechanism.

Moreover, we happen to be on a tightrope and run the risk that, as Protevi (2009) said: "the abstraction of the embedded school impoverishes its notion of "cultural scaffolding" by relegating the cultural to a storehouse of heuristic aids for an abstract problem solver who happens to be endowed with certain capacities of affective cognition, namely the ability to interact successfully with the people and cultural resources to which he happens to have access" (p. 25).

That is why I came close to Varela's (1996) positions, without needing to use it for the sake of approaching qualia experiences. *Neurophenomenology* (Varela, 1996) aimed to contribute to the cognitive sciences with a rigorous method for observations of first-person cognitive experiences, so that third-person research can be better understood. This method was slightly related to the practice of self-perception, which in its most phenomenological or Zen aspect, promotes an *epoché* or suspension of judgement close to mindfulness.<sup>54</sup> However, without delving into these depths of the mind, I do translate this self-examination into an observation of the most everyday, "real-world" and situated conscious cognitive states<sup>55</sup>. After all, I think of Sven Walter's apt diagnosis of the shift in the demands of cognitive science from *what* cognition is to *where* cognition happens (Walter, 2014, p. 241) with a certain pessimism: post-cognitivism stops analysing

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<sup>54</sup> "My proposal implies that every good student of cognitive science who is also interested in issues at the level of mental experience, must inescapably attain a level of mastery in phenomenological examination in order to work seriously with first-person accounts" (Varela, 1996, p. 346-7).

<sup>55</sup>See the work of Petitmengin (2006, 2017, 2021) and Vermersch (2016) for an attempt to bring neuro-phenomenology into "micro-phenomenology. Their methods describe precise internal operations of a temporal granularity of about a quarter of a second.

and describing the richness and varieties of everyday cognitive experiences; it focuses on including a situated, relational, practical and dynamical approach into the study of (only) task-relevant and adaptive engagements.

*After all, few post-cognitivist approximations delve into the daily cognition where thoughts and elusive observations are crossed with ideas, images, affects and concerns which are not necessarily present at the moment. These are also cranky elements or elements that interfere and that often belong to different time scales of realisation. Some of them abstract, some unadaptive, some of them even unrealisable.* For the most part, their analysis, description or exploration is not called for; instead, the understanding of human cognition has moved towards a step-by-step engineering where, at most, an attempt is made to reconstruct the richness starting from biological adaptive loops or starting from the process of adscription to intersubjective norms, *as if adding loops were adding Ptolemaic epicycles to the system*<sup>56</sup>. It's a post-cognitivist project, the efficacy of which I don't question in terms of achieving a description of human cognitive richness, if that's the goal at all. I do, however, question the normativity it implies for the current picture of human cognition.

As said, among its consequences is the assumption that cognition equals to exploit intelligent and affective capacities exclusively to find forms of adjustment. Paradoxically, we observe that it is a definition that serves (and has served) perfectly well for artificial "cognitive" systems (see §2.2). Just because human beings are coevolving with its *Umwelt*, it does not follow that this is their only goal. Such a definition can be very restrictive for humans, for some even more than for others, because it suggests a criterion of *proper functioning* that evaluates as right or wrong on the basis of the ability to adjust. The variety in the social and the biological spectrum, which does not cease for a moment to manifest, to expand or to try to do so, should make us rethink the assumption that cognition's specific functionality is to find fit.

What I have just mentioned defines a post-cognitivism as focused on how cognition solves concrete tasks in its aim to adapt and adjust to the environment. That normativity points beyond what Aagaard (2021) called "the dogma of harmony" in the discussion context of human-technological cognitive relation. Namely: "that 4E scholars tend to paint an overly idealised picture of human-technology relations in which all entities are presumed to cooperate and collaborate" (p. 166).

Here I suggest that this is very much present in the whole post-cognitivist paradigm, not just in the 4E research program. Moreover, I pretend to go beyond the (very interesting) technological question and refer also to the coordinations

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<sup>56</sup> From Deleuze, and based on the ideas of four contemporary post-cognitivist philosophers of habit, I will attempt an immanent approach to the organism, which does not have to add loops from outside (transcendentally) (§4). With his *Habitus*, I will try to emphasise another interpretation of the empirical evidence held by post-cognitivism, decentring the focus on cognition on attunement and reinterpreting coordinations as a necessary *consequence*.



happening in the symbolic, normative and intersubjective domain. As said, I wonder about the richness of human cognition in an epistemology of attunement whose explanations deal with the attempt of agents to fine-tune or calibrate their behaviours to the intersubjective process of norm-setting. So, I allow myself to rewrite and reinterpret for my purpose three of the precautionary principles that Aagaard (p. 177-8) proposes:

- Methodologically speaking, the question of attunement has to move from being considered a presupposition about the purpose of cognition to being considered an empirical event. Describing and exploring the cognitive richness of biological or political agents could be one of the first pillars of the methodology of cognitive science before going on to describe the mechanisms of their generation.
- Analytically speaking, the spectrum of post-cognitivism literature needs to broaden to include experiences prior to being categorised as fulfilling immediate task-relevant engagements. This is not to ignore or deny all the evidence and even the positive aspects of coordinations, attunements and adaptations, but before modelling why such cognitive phenomena have occurred through exposing *where* this kind of cognition occurs, it is important to know the extension of the object in question, which in everyday life operates beyond harmonical and agreement engagements.
- Theoretically speaking, it would suit post-cognitivism to acknowledge the normative ambivalence or non-neutrality of attunement and cooperation when characterising human cognition. It is possibly an important factor, but not the trend behind all cognitive phenomena.

### **Some conclusions**

The normative critique that I develop here does not deny assumptions such as adaptivity or the importance of coordinations and cooperations, but rather when these define characteristics to cognition that postpone the scientific concern about daily human cognitive richness and complexity. In other words, what matters are the practical and theoretical developments that follow from this fit-based engineering conception of human psychology. Concretely, this section has suggested the assumptions that go hand in hand with the study based on an *epistemology of attunement*, namely, that cognition focuses exclusively on coordinated, *harmonical* and *task-relevant engagements*. But my analysis needs to go somewhat deeper.

To continue it is important to assess the nuances of other assumptions accompanying the current habit-based epistemology. In the following sections deeper presentations of current philosophy of habit will be followed by discussion of the remaining assumptions not yet dealt with: *the equilibrium tendency*, *the question of motivation* and finally, *cognition as prediction*. Not surprisingly to the lines of this analysis, the advance of the *predictive mind theory* and of the *free-energy principle* in post-cognitivism, give us the basis to deepen what has

been said about the attunement and about the mechanistic drift of the concept of habit.

Said that, one last word before moving on to the next chapter. Throughout this section I have taken the opportunity to briefly mention three characteristics of the concept of habit that I will test with Deleuze's ones in Chp. 4. Habit: 1) allows for specialisation, deepening or disclosing of other spaces of action; 2) allows for an immanent approximation of the unfolding of the levels of analysis in which the agent dwells; 3) promotes the variety of forms of life.

### 3.2 Contemporary Philosophy of Habit: Predictive Engagement & the Free Energy Principle

As I did in the previous section, the present one consists of two parts: an exposition and a discussion. On this occasion, before presenting case studies, I present the integration of predictive mind theory with post-cognitivism. After that I will present three case studies: K. Friston's free energy principle, and two recent post-cognitivism proposals that develop the free energy principle in spite of its fervent computationalism, the one from S. Gallagher and the ones of E. Rietveld, J. Kiverstein and J. Bruineberg.

As the thesis holds, the concept of habit is fundamental (and it is in its mechanistic and automatic connotation). Due to that, I insist on keeping in mind the previous analysis of habit. So, this section can also be seen as a deepening of the discussion on the *epistemology of attunement*. Particularly, I will deal with what I call "the *epistemology of prediction*", namely, that cognitive subjects are understood as being cognitively aimed at predicting outcomes in order to remain coherent, cohesive and adjusted to the environment. The epistemology prediction follows the focus over coordinated, harmonical and task-relevant engagements (§3.1) as the epistemology of attunement does; as well as is absolutely in line with the historical drift of the concept of habit (§2.2). However, so to say, this time I am closer to analyse the presuppositions belonging to the "goal" part in the "habit-goal dualism" of post-cognitivism. Specifically, I will discuss the assumptions of 1) the meta-direction of agents, 2) the goal of equilibrium and entropy-resistance, and 3) the origin of motivation.

#### **Habit from Predictive Coding to Predictive Engagement**

It is in the midst of the development of theories on cognition that the cognitive models of *predictive mind*, also called "predictive coding", have gained attention. This approach is now presented as manifestly related to the conceptions of the 4E, situated cognition and ecological psychology (Allen & Friston, 2018; Badcock et al., 2019; Clark, 2013).

The theory of the predictive mind proposes that our cognitive processes consist in adjusting the mental models we have of the world in order to minimise

unexpected experiences. Essentially, it suggests that the organisation and connections within our brains resemble a probabilistic model, where neural connectivity tries to infer the external causes of events. According to the theory, this process of adjusting the neural connections resembles how Bayesian statistics work, i.e., by updating the previous model according to the new probabilities given by the new data (Hohwy, 2013; Badcock et al., 2019). So, the main tenet is that instead of relying on fixed assumptions, agents are constantly updating the probabilities of events occurring in the world (Clark, 2013; Rescorla, 2015, p. 629). In essence, the predictive mind theory provides a probabilistic framework common to both neurobiology and machine learning.

This idea is not new at all. H. Helmholtz (1867) is considered for the predictive mind literature to have first argued that the perceptual system exclusively consists in executing an 'unconscious inference' about the environment given the hypothesis it has according to its past experience when confronting a particular sensory stimulation. With this simple mechanism, Helmholtz explained the phenomenon of perceptual constancy (using 'implicit assumptions' to discount variations in proximal stimulation) and perceptual illusions (fallible perceptual cases of applying implicit assumptions).

More contemporarily, predictive coding was used as a strategy for optimising information in signal processing, (among them was used in Shannon's theory of information)<sup>57</sup>. The idea behind that, as Bayesian principles also claim, is that it is more important to allocate resources to code the least predictable messages than to code the likely ones. It is on this basis that cybernetic developments from the 1950s yield to developments in machine learning by applying multilayer backpropagation techniques (as exposed in §2.2), p.e. the "Helmholtz Machine" (Dayan et al. 1995).

Finally, in 1992, Mumford exposed how that Bayesian theory seems to be present neurologically (Bastos et. al, 2012; Lee & Mumford, 2003; Shipp, 2016; Friston, 2022). According to this, "conditional expectations are thought to be encoded by deep pyramidal cells (i.e., representation units) at each level of the cortical hierarchy that convey predictions downward to suppress errors at the level below, whereas prediction errors (or deviations from expectations) are encoded by superficial pyramidal cells (i.e., error units) that convey errors forward to revise expectations at the level above, thereby minimising prediction error" (Badcock et. al, 2019, p. 1322).

To sum up, three are the predictive mind theory's main notes; which share with all the computational models of embodied AIs: 1) *Prediction error*, which is the basis of the model. The unexpected, the "surprise" is what is encoded, so that in Bayesian terms the posterior probability is revised or increases its confidence. 2)

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<sup>57</sup> For a historical review see Musmann (1979), Shi & Sun (1999) and Rescorla (2015). And for a deeper and extensive explanation of the actual predictive processing, I particularly recommend Clark (2013; 2015).

*Hierarchical organisation.* The (neural) system, whether it ends up in the brain or extends beyond it, achieves the cognitive goal of calibrating itself due to a multilevel cascade of bidirectional signals. Top-down signals trigger neural activation according to the inferred state of the world, and the low-level propagates the discrepancy between what is assumed by the high-level layers and what is actually incoming. This is an iterative loop of adjustment or backpropagation. 3) *Active inference.* The adjustment between the model and the world is not only produced by "improving" the model, but also by transforming the environment to adjust the model.

As can be seen, contrary to the supposed post-cognitivism tenets, this mechanistic inferential process has strong internalist and representationalist connotations. In its defence, J. Hohwy (2013, 2014, 2018) is the clearest contemporary advocate of this cognitivist version who is in dialogue with 4E authors. For him, "PEM [prediction error-minimization] reveals the mind to be inferentially secluded from the world, it seems to be more neurocentrically skullbound than embodied or extended, and action itself is more an inferential process on sensory input than an enactive coupling with the environment." (Hohwy 2014, p. 1). Indeed, for Hohwy (2013, 2018) the consciously perceived world is a projection of the best representational model generated in the brain (almost in the manner of the idealist philosopher G. Berkeley).

The crux of all this is what we might call the move from predictive coding to *predictive engagement*<sup>58</sup>. Or, what we could also call, the integration of the theory of predictive mind with post-cognitivism, which moves away from a skull-bound predictive processing and from classical representationalist positions towards the complete imbrication of organism and world (Gallagher & Bower, 2014; Gallagher & Allen, 2018; Fabry, 2015; Kirchhoff, 2015; Hutto, 2017). Briefly outlining it, predictive engagement is a probabilistic but situated, enactive and embodied computationalist approach to cognition, that shows that the whole organism is analogous to a mechanism that would be engaged in tuning the model it embodies in order to fit the statistical structure of the world. This process of fine-tuning the model the organism *is* is to be considered the cognitive process *per se*.

In more general terms, predictive engagement integrates the roles of perception, action, attention, learning and environmental structuring, but also of interoceptive processes and affectivity as part of what constitutes the hierarchical adaptive system (Kiverstein, Miller & Rietveld, 2019; Seth, 2013). Yet, the three characteristics of predictive coding (prediction error, hierarchical organisation and active inference) remain inviolable for predictive engagement.

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<sup>58</sup> See Gallagher & Allen (2018) for an interesting distinction between these different meanings. From now on, I will generically use the meaning "*predictive engagement*" which coincides with the terminology advocated by these authors. However, my decision is not due to the post-cognitivist (especially enactivist) character of this term or for integrating the *free-energy principle* as advocated by the aforementioned authors, but because I consider that "*engagement*" is literally the most generalist terminology.

So, ultimately, predictive engagement houses a computationalist and statistical inherited perspective revisioned under a pragmatist philosophy.

Up to this point, *it can be shown, once again, that habit plays a crucial role in the shift from predictive coding to predictive engagement.* Additionally, it can be shown that they maintain a habit-goal dualism, which I will explain in more detail later on. In the most basic and disembodied sense, predictive coding requires not the two, but even a third basic element. One is the routine, the chain of steps performed by the neural network, also known as the algorithm, which is equivalent to habit performance. The other element is the goal of the programme, as something that is instilled by the engineer and gives the direction and sense to the habitual tasks. While the third necessary element is memory, which corresponds to a generative model that brings “priors” and is only passively updated.

My point is that *predictive coding begins its transition towards predictive engagement, not only motivated by decentring cognition from the brain, but when it realises that memory and habit are the same thing: they both are the knowledge.* Neurologically, but also computationally, revising knowledge is the same as revising the habitual paths and configurations of the nervous system. We see this step clearly with philosophical ideas that delve into sensorimotor contingencies as in Noë (2001, 2009), or in the incidence of skillful knowledge or *know-how*, with Dreyfus (2004). And we also see this in the embodied applications of machine learning, where it realises that what is being reviewed is the algorithm itself, which is capable of self-improving its performance and learning new ways to attend, move or process (see §3.1).

This shift is also evidenced by neuroscience that applies Bayesian assumptions. These studies show that the neural connectivity that guides the perceptual-motor action is the same that it is rewired or reinforced according to the prediction errors that scale. After all, neural plasticity, so to speak, means that the neural system is encoding a know-how that serves to physical, mechanical and motor tasks as well as more abstract and linguistic ones. In this sense, studies such as that of Körding & Wolpert (2004) on the adjustment of sensorimotor tasks or that of Weiss et. al. (2002) explaining motion illusions show this idea through neuroimaging techniques.

In this habit historical drift, the definitive step that predictive engagement finally does is to consider that know-how's encodings not only happen in the brain's connectivity, but throughout a larger nerve-body-environment system (Gallagher & Allen, 2018). For the predictive engagement approach not only the inferentialist or representationalist position is *more or less* eliminated, but also, the modelling function does participate in a larger system: "We must here understand 'model' in the most inclusive sense, as combining interpretive dispositions, morphology, and neural architecture, and as implying a highly

tuned 'fit' between the active, embodied organism and the embedded environment" (Friston, Thornton and Clark, 2012, p. 6).

In short, for predictive engagement, "an agent does not *have* a model of its world - *it is* a model. In other words, the form, structure, and states of our embodied brains do not contain a model of the sensorium- they are that model" (Friston, 2013, p. 213). *And is together with this that, indeed, the focus of the proposal becomes explicitly the cognitive goal of attunement:* "a kind of ongoing predictive engagement -a dynamical adjustment in which the brain, as part of and along with the larger organism, actively responds in ways that allow for the right kind of ongoing attunement with the environment" (Gallagher & Allen, 2018, p. 2634).

#### **(Case 4) K. Friston: The FEP as Embodying the Goal of Attunement**

But the historical shift of predictive processing towards engagement does not arise solely from the gesture of trying to extend the premises of predictive mind beyond the brain. It does neither arise because, as I said before, memory and habit are beginning to be conceived together in a more pragmatist view. But for extending predictive processing to post-cognitivism it was crucial to contemplate a goal for the habit part; equally as the engineer fixes a goal for the adjustive system. And this is what precisely occupies K. Friston and will be acknowledged by predictive engagement: according to Friston, the idea of minimisation of prediction error responds to an even deeper and more fundamental organic principle of all biology, in which the brain *also* participates: *the free energy principle*.

The free energy principle (FEP) starts from the assumption that biological systems have the goal to resist a natural tendency for disorder by minimising *free energy* (Friston, 2010, 2013; Parr, Pezzulo & Friston, 2022; Badcock et al., 2019). This follows the law proposed by E. Schrödinger (1944) that life is the process of attempting to delay entropic dissolution, i.e. resisting the second law of thermodynamics (Friston, 2013; Ramstead et al., 2018; Badcock et al., 2019).

In physical terms, thermodynamic free energy quantifies the energy available to do useful work. Translated to the cognitive and informational realm, free energy is the extra energy that has not been used for modelling the world. Therefore, for biological systems the better the fit between model and environment, the lower the information-theoretic free-energy and therefore, the less extra or less still-available energy will flow: this is intuitive, since more fit means that more of the system's resources are put to "work efficiently" in representing the world.

With this idea, an organism's distal imperative to survive and maintain functional states within physiological limits (i.e. *homeostasis*) translates into a proximal avoidance of surprise (i.e. what does not fit the model, i.e. what will

increment drastically the free-energy) (Friston, 2010)<sup>59</sup>. In terms of the free energy principle, we would say that the system (*the brain or the embodied model*) aims to reduce the waste of energy: the model is calibrating itself to the world in a process that does not allow its complete dissipation, but, on the contrary, guarantees its individuality as an agent. Such is the continuity with the environment that "every aspect of our brain can be predicted from our environment" (Friston, 2013, p. 213). Due to co-implication, a system can minimise free energy either by changing its expectations or by changing the configuration to change the way it samples the environment (i.e. active inference).

In conclusion, reducing free energy allows one to not succumb to energy waste, and thus succumb to the entropic fate of dissipation. Contrarily, reducing free energy reduces the amount of uncertainty in the environment and thus maximises its ability to control it and survive. Ultimately, the law governing any biological system is to resist the second law of thermodynamics (Ashby, 1947; Friston, 2010, 2013; Badcock, 2019): the organism stays within its physical limits, it does not disintegrate.

Recently, FEP has been applied to systems (that extend beyond the brain limits) to explain a wide range of cognitive processes, including perception, attention, memory, learning, affective dynamics and decision-making (Friston et al, 2014, 2017; Friston, 2010, 2018; Mirza et al., 2016; Hesp et al., 2020). The range of applications is so varied, extending from explaining written and oral comprehension (Fabry, 2015; Pickering & Garrod, 2013), depressive mechanism (Fabry, 2020) or considering that sensorimotor events are the basic unit of conceptualization (Butz et al., 2021). Moreover, FEP has also been applied in artificial intelligence and robotics to design adaptive and autonomous systems capable of adjusting to changing and complex environments (Lanillos et al., 2021; Oudeyer, 2018) In fact, it is argued that FEP escapes beyond the biological realm and operates in any artificial agency (Kiverstein, Kirchhoff & Froese, 2022; Raja et al., 2021) because "any ergodic random dynamical system with an attractor and a Markov blanket<sup>60</sup> behaves as if it were minimizing the variational free energy of its particular states" (Raja et al., 2021, p. 3).

Without fear of being wrong, beyond the philosophical thrust that has been developing over the years in order to decentre the subject from the brain, it is the FEP that has offered an incredibly revealing contribution in order to ground the post-cognitivist paradigm, and importantly, with directly researchable implications. Indeed, the predictive mind, as a theoretical paradigm, was well

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<sup>59</sup> Although surprise itself cannot be assessed, free energy imposes an upper bound on surprise, so biological systems can indirectly reduce surprise by minimising their free energy (Badcock et al., 2019). This is why FEP generalises predictive coding theory: biological agents actively minimise free energy by reducing their prediction errors (and thus indirectly reduce surprise).

<sup>60</sup> The Markov blanket is a statistical-theoretic separation that differentiates the set of external and internal factors that influence the agent's behaviour. We can put the separation line between brain and body, between body and environment, between a near-Umwelt and large-Umwelt, etc.

established through its neuroscientific research and through its applications in the fields of cybernetics in which Friston himself, from its beginnings to the present day, is still involved. But now, the FEP, which works from a totally post-cognitivist position, offers a broader theoretical framework and models that allow post-cognitivism to approach research from biology, physics and computer science. All in all, the FEP refers directly to ideas of embodiment, embeddedness, cognitive niche and enactivism (see especially, Allen & Friston, 2018; Gallagher, 2017, p. 127-130; Kirchhoff 2015, 2018).

As I will discuss in the following discussion. Underlying these theories, as a point of support, is a conception of habits according to which they are exclusively repetitive and routine actions that resemble a bodily extension of controlled habitats: they are the basis of the *stability* of free energy.

### **(Case 5) S. Gallagher: FEP and hermeneutical alignment**

Among these updates of predictive coding into post-cognitivist terms by integrating the free energy principle, perhaps one of the most remarkable are those of Gallagher (2017; Gallagher & Allen, 2018). Gallagher's work has oscillated around the phenomenological aspects of intersubjective dynamics (Gallagher, 2008; Gallagher & Zahavi, 2008). He was one of the firsts who defended the inclusion in the study of cognition what would now be known as *cultural scaffoldings* such as legal systems, research practices, and cultural institutions (Gallagher, 2013). Today he extends this work by revisiting his hermeneutic and enactivist motivation through predictive engagement and FEP.

His central idea is that "any action or perception is constrained by this need to maintain autopoietic integrity" (Gallagher & Allen, 2018, p. 2636). Thus, the modelling of the world, does not happen only in the brain, but that our whole body, including affectivity, and the dispositions our body has in a given environment are already a way of modelling the world (Gallagher & Allen, 2018; Gallagher, 2017). Specifically, according to him, free energy is reduced, because the agent is adjusted or *attuned* to the world. Prediction errors are coded through the whole body, and not solely in the brain representations, that's how enactivism meets predictive coding.

In another sense, Gallagher, who does not forget his philosophical background in hermeneutics, thinks of the relationship with agents and environment as a dynamic circle. The agent not only tries to predict and cognitively represents a model of what is happening, but the agent which does not cease to be active and involved, already anticipates and conditions what is happening. The past of its interactions already makes the body moulded to that end. But the same is true for the other agents in our environment. They are in the same dynamic. One transforms oneself as one transforms: it is all one big dance.

Applied to the comprehension of others, this (*ideal*) process is supposed to bring us closer to each other, to coordinate us. In short, mutual understanding is not



only the independent intellection of one, it is (ideally) the attunement of all. Gallagher & Allen (2018) stretch this Gadamerian and Habermasian conception and call it "*enactive hermeneutics*". For, according to Gallagher, this does not only consist of an intellectual approach, but that all agents also involve their non-verbal bodily behaviour and the alteration of context. In Gallagher's words, the purpose of organisms is the "*alignment*" of all (2018, p. 2641).

Gallagher's ideas belong to research focused on the epistemology of attunement. With its peculiarities, Gallagher's *alignment* fits with the concepts of *enculturation* (Menary, 2018; Kirchhoff & Froese, 2017), *mind invasion* (Slaby, 2016), *mindshaping* (Zawidzki, 2013, 2018), *participatory sense-making* (De Jaegher & Di Paolo, 2007; Di Paolo, Cuffari & De Jaegher, 2018) or *skillful coping* (Dreyfus, 2002, 2014), among the most remarkable ones. I thus perfectly apply everything said in the previous section about coordination, task-relevant and harmonical engagements. Alignment, however, explicitly implies in Gallagher that the organism aims to minimise surprise as directly linked to its *survival* and, specifically, does so through the mechanics of *anticipating* what the world is thought to be like and how to adjust to avoid surprises.

Unlike what we saw with Hutto or Heras-Escribano and the authors discussed (§3.1), not only is the organism constituted, moulded on the basis of the history of its interactions, but for predictive engagement anticipation and prediction play a constitutive motor of the organism: it is a tendency proper to hermeneutic intentionality or, in Friston's terms, proper to the resistance to the second law of thermodynamics. *At least for predictive engagement, prediction is the other side of the coin of attunement. But any position based on the need for external or internal coordination now finds a theoretical basis based on the anticipation of how to reduce surprise: the free energy principle.*

As far as habit is concerned, *the consequences of this is to assume that the free energy principle offers an intrinsic goal to the agent whose habits serve.* Hence, habit only works for its implicit goal of reducing uncertainty; if for cognition thus understood there is anything more than achieving that goal... But let us go a little further before we enter into the discussion of this issue.

#### **(Case 6) J. Bruineberg, J. Kiverstein & E. Rietveld: FEP and Optimal Grip**

We cannot discuss the presuppositions of the epistemology of prediction without first pointing out the post-cognitivist authors who, apart from Gallagher, are defending the FEP the most. They are J. Bruineberg, E. Rietveld and J. Kiverstein. In different papers and together with other acute collaborators, they offer the ground for bringing together enactivism, embodiment and affectivity, with the FEP and the theory of affordances.

In particular, in Rietveld, Denys & Westen (2018), they lay the foundations of the "*skilled intentionality framework*" (some also in Bruineberg & Rietveld, 2014;

Kiverstein & Rietveld, 2015). Its main idea is that the agent is immersed in a landscape where there are multiple affordances simultaneously. With this, they insist on a richer notion of affordances in order to support complex behaviours. We speak of a complex field of affordances because, either we can use/participate in several affordances that are present simultaneously, or because over time, the affordances allow us to perform certain skills, with which we alter the environment and generate new affordances. Hence, affordances do not only apply to basic minds, but in their complex, combined and chained forms, affordances allow higher-cognition phenomena such as long term planning, reflection, creativity, imagination, social interaction or language use (2018, p. 43).

In short, for these authors it is a matter of taking to the extreme the idea that all knowledge is a *know-how*-knowledge: all cognitive aspects, even the most abstract or higher-order ones, are practical knowledge that would be supported by more complex forms of using affordances. Although they do not develop any example, they do refer to language, the use of sophisticated technological instruments or social conventions as complex affordances that support performing highly complex tasks (Rietveld, Denys & Westen, 2018). Let me explain this a bit. Language is understood to arise from the ability to arrive at a common use about the meaning of sounds. We pragmatically scaffold on the meaning of sounds until they become more complex to the point where they can be structured and even used internally to talk to ourselves. Technology, on the other hand, is also about making tools out of the opportunities for action offered by certain of their components. Thus the tools become more sophisticated. Another example is social conventions, which can also become more sophisticated in the sense that they invade and permeate our daily lives in terms of small rituals of daily behaviour as well as chores that occupy our day, week, months and long-term plans. But all in all, the most relevant thing for these authors is to see that these all complex affordances occur simultaneously. Thus, language, technology and culture are key examples of affordances present at the same time that, when coordinated in a particular way, allow us to be using my environment to, for example, learn how to grow my food or earn the money to feed myself, organise and make a weekend meal with my friends, or to be in front of this computer writing this thesis on an alternative way of conceiving habits. In the end, it is about having selective engagement with concrete multiple affordances occurring simultaneously depending on the abilities and aims available for a specific form of life (Rietveld, de Haan, & Denys, 2013; Bruineberg & Rietveld, 2014; Van Dijk & Rietveld, 2017)<sup>61</sup>.

My critique is that although Rietveld et al. (2018) talk about the variety of forms of living (p. 47), the question of how this process leads to the increasing multiplicity of forms of living remained open, and I claimed that this was, of

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<sup>61</sup> The concept of “form of life” is closely related to what Colombetti & Krueger (2015, p. 1169) and Slaby (2016, p. 5) seem to have in mind with the idea of “*bodily-affective styles*”.

course, unanswered because, fundamentally, their approach is also based on the idea that cognition is a mechanism for adjusting and coordinating actions in order to maintain agent's equilibrium in such a sea of affordances (Bruineberg & Rietveld 2014; Kiverstein & Rietveld 2015; Bruineberg et al., 2018; Rietveld et al., 2018). *To say it quickly, for them it is the agent's grip that holds complex activity but because this grip is considered optimal as far as it holds the equilibrium between agent and environment (and environment that it is also shaped by action), it is hard to see in their theory why there is a growth of forms of living instead of its homogenisation.*

In fact, the characteristic I want to point out of Rietveld et al.'s (2018) proposal is that the laws governing the grip on affordances, and hence, coordinating them follows a tendency to equilibrate agent and environment that follows from the FEP. The ultimate goal is that the skilful grip over complex affordances allows to reduce disequilibrium in terms of thermodynamic homeostasis (Bruineberg, Kiverstein & Rietveld 2018). According to these authors, living beings are evolutionarily designed to continue to maintain an *optimal grip* on the changing environment (Bruineberg & Rietveld 2014; Kiverstein & Rietveld 2015; see also Kirchoff, 2015, p. 17).<sup>62</sup> Especially for humans, optimal grip must be achieved by conjugating multiple and complex affordances.

It is important to note that, according to the authors, what the grip achieves is not stability *per se*, but to remain in a zone of *optimal meta-stability* (Kelso 2012; Rietveld 2008; Bruineberg and Rietveld 2014; Rietveld et al., 2018). That is, the agent does not seek to adhere to or hover around a set of affordances that places it in a homeostatic state, but rather the agent seeks to stay in the perfect place so that it can move to another set of affordances if necessary due to some internal or external perturbation (Bruineberg & Rietveld, 2014).

The fact that the agent is attentive to this meta-stability and not just stability provides very interesting consequences for the agent. Because, what this approach is saying is that the environment not only provides the opportunity to act in order to achieve the goal (i.e. to stay within the boundaries of the individual), but that *our adjustment to the environment also provides us with the security of being able to predict any possible changes in order to stay within that goal*. That is, the skilled intentionality framework is not just a matter of adjustment, but an epistemology for prediction. As Rietveld, et al. (2018) point out: "The concept of skilled intentionality as multiple simultaneous states of *action readiness* for engagement with affordances entails orientation toward and preparation for possibilities for future action, which is a situated form of anticipation"(p. 43).

Said that, for the time being, the latter authors have recently been addressing ontological questions. Specifically, on whether the Markov blankets that define systems in terms of FEP offer ontological or rather instrumental definitions. This

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<sup>62</sup> See "Note on adaptationism" in 3.1 for a first discussion of this point.

has many implications for defining the continuity or discontinuity between life and cognition (Bruineberg et al., 2022; Kirchhoff & Kiverstein, 2021; Kirchhoff & Froese, 2017; Seth et al., 2022). However, personally, I am more interested in the principles on which the FEP is based for cognition. How does FEP explain, for example, the variety of life forms, the fact that the brain contains intentions that are not yet in the environment or what exactly is the impulse of FEP to control the environment and reduce uncertainty? These topics are open to discussion, as many authors have circled around these issues. I will now try to delve into that.

## **Epistemology of Prediction**

### **(Discussion 4) Predictive Models and the Habit-Goal dualism**

At this point, I have considered that this particular concept of habit is reflected in a double epistemology that permeates post-cognitivism (regardless of its internal discrepancies): the epistemology of attunement (§3.1) and the *epistemology of prediction*; which are but two sides of the coin of the conception of habit they have inherited.

Within the space of this thesis, I have tried to make the relationship between prediction and attunement a little bit more explicit. On the one hand, in the previous discussion, authors who have been referred will be present in this section. On the other hand, in the present discussion I will try to show that the issues dealt with in the epistemology of attunement will now be continued and deepened. Those issues were 1) that theories dealt with a cognition as exclusively focused on task-relevant engagement, harmonious encounters and coordination; 2) that they appeal to adaptation as a mechanism exclusively of attunement and synchronisation; and 3) that social normativity was understood as a residue of a dialectical process equatable to the same economic concept of an invisible hand that placed us in equilibrium.

One difference between the previous section and the present one lies in that the epistemology of prediction deals explicitly with the counterpart of "goal" in the habit-goal dualism. Minimising prediction error or reducing free energy, apart from describing cognitive or organisational mechanisms of coordination, synchronisation, cooperation or control, are also serving the *why*, i.e. the goal, of attunement. From the aim of achieving these goals follows their need for prediction of the environment and of the organic possibilities. Wasn't cognition studied only in its capacity to control and anticipate, for example, in the mechanisms of *distributed cognition* (Hutchins, 1995; Henrich, 2004b; Jaegher, Di Paolo, Gallagher, 2010), *mind invasion* (Slaby, 2016), *mindshaping* (Zawidzki, 2013, 2018), *niche construction* (Sterelny, 2010, 2018), *sensorimotor mastery* (Di Paolo, 2017, 2021)? The difference may lie in that they do not talk explicitly about this "why" but the epistemology of prediction, together with FEP, does.

Following this, in the last ten years we have seen the rise of predictive processing models and the FEP, and with this, the habit-goal dualism narrative

has become nearly completely explicit. Part of post-cognitivism has been supporting them for some time now and their integration seems to be growing. And who knows if it is permeating almost completely the cognitive sciences, since predictive processing not only involves fields close to neuroscience, neuropsychology and the philosophy of mind, but its proposals are twinned with the cognition of the most cutting-edge systems of machine learning and artificial intelligence.

As an example of the presence of habit-goal dualistic thinking I bring up a recent case. As I am writing these pages, on 16/03/2023, a Microsoft event presents their new advances made together with the artificial intelligence lab OpenAI. Among these advances is the integration of language processing artificial intelligence Chat GPT-4 as a “copilot” into their *Office* suite of word processing, calculation and slide programs. All you have to do is type in natural language what you want, and in a second a 30-page essay on your topic, 20 slides, or the presentation of the calculations you would like to perform can appear. In this event, the Corporate Vice President, Jared Spataro, (or an avatar of him) tells us their vision of the future of work: "The reality is that people spend a lot of time on drudgery work and tasks that zap our time, our creativity and our energy. *We become separated from the soul of our work*". And therefore, the copilot comes to solve this, so that we can go directly to creativity, to our goals. That is, Microsoft clearly understands a difference between the usual and routine part versus that which "feeds our souls". It not only participates in a mechanical conception of habit, but consequently polarises it with the goal and, moreover, believes that it is what holds us back. As if creativity arises independently of habit. As if creativity or ideas were our goals, "the soul" of our actions, separable from "mechanical action". This position is in complete contrast to the version of habit that we propose here. We will come back to this topic, which seems to be a discussion of centuries past, but which we will see infiltrates the epistemology of attunement and prediction no matter how much we adopt post-cognitivist postures.

But, I insist, the fusion of prediction with post-cognitivism is nothing that should surprise us or that has been paradigmatic of now, but rather follows the line of what was already implicit in the concept of habit since the naturalisation of computationalism in the 1950s (or the computationalisation of the natural in terms of information; see §2.2). However, unlike in the epistemology of attunement, the concepts of prediction, efficiency, optimisation, fine-tuning or goal pursuit are becoming increasingly explicit. A small example of this is that *the trend of the use of the idea of goal is ever increasing since the beginning of the 20th century and is nowadays twice as frequent as in the 1960s* (Testa & Caruana, 2021. p. 9). concept of habit. This is the opposite situation to that of the use of the concept of "habit" in the history of cognitive sciences (Testa & Caruana, 2021. p. 9).

Representing the habit-goal dichotomy, is paradigmatic the work of Maisto, Friston & Pezzulo (2019) in which they computationally simulate habit formation. They are grounded in the classical idea according to which we must distinguish between two ways in which organisms control the environment: deliberate (or willed; which are flexible) and habitual (or automatic). Furthermore, they assume that this distinction "is considered a hallmark of adaptive behaviour and cognitive control, which permits one to combine adaptivity and parsimony; *but its mechanisms are incompletely known.*" (2019, p. 298, my emphasis).

So, despite the *incomplete* understanding of these mechanisms, they are based on dualism. More precisely, their proposal is to discuss the mechanism of *the habit-goal dualism*. Opposed to the view which holds that the degree of uncertainty of the context for a particular system is the crucial aspect that will help to opt for an habitual or for a deliberate type of processing, they argue that habit is always a residue of deliberate action, it is its optimised and efficient version. (So, the opposite of what was proposed by thinkers like Heidegger, Husserl or Merleau-Ponty, who argued for the priority of the practical world). The research of Maisto et al., (2019) is about to show this mechanism with *cache methods*<sup>63</sup>, a widespread information storage technique in reinforcement learning, machine learning and artificial intelligence.

But the crucial aspect is that, while applying caching methods, *they realise that it is also possible to shift control from habitual mode of processing to deliberate ones, so that the switch of control is bi-directional. This happens as long as the system in habitual control can recognise that the context has changed.* "In most real-time situations, a person whose actions are controlled automatically are still able to re-engage deliberative processing when necessary, and especially when automatic control fails" (p. 299). In other words, these results show that *context sensitivity is preserved during habitual mode.*

In my view, what his work is really suggesting is not the dualism they held but that, even with computational mechanisms, habit-goal dualism is beginning to blur! Regardless of that, their work still focuses on analysing that this transfer of control can be calculated (in these computational simulations) according to the generative model's ability to minimise uncertainty; which ultimately, for these authors, is evidence that the transfer of control from one to the other "is yet another way to minimise free energy"(p. 309) (i.e., simply to optimise). Through their paper not only hypotheses, but even questions about what this context-sensitivity means or how it happens in the system are completely missing.

Indeed, the fact that control selection in these cases is based on the fact that artificial neural networks contain (in their hidden layers) contextual factors (p.

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<sup>63</sup> A cache is a software or hardware component aimed at storing data so that future requests for the same data can be served faster.

303), I believe, is an argument in favour of helping to undermine any definition of habit that has come out from a history of research with animals under conditions of extreme contextual deprivation, i.e, it must undermine a definition of habit that has come out of the unnatural devaluation of learning rewards without the possibility for the animals to search for others, or out of research with machines with poor context (§2.2). However, this shift of conception is not yet the case, as Maisto et al. (2019) still endorse the classical concept of habit.

Ultimately, against the propagated habit-goal dualism which Maisto et al. (2019) represent, I hold that the definition of habit could change. As I suggested at the beginning of the chapter, recent research undermines de dualism (Vandaele et. al, 2019; Smith & Graybiel, 2022). But personally, I do not think we should wait for a proper *neuropsychological* definition of habit, nor do we have to wait for neuroimaging techniques to be out on the streets. In fact, as I will argue in §4 a non-Watsonian conception of habit is offered by Deleuze and by the early pragmatists and phenomenologists. But before this, I will continue to delve further into some of the presuppositions of the "goal" aspect.

#### **(Discussion 5) Homeostasis and the Trust in the Free Energy Principle**

The central idea of the FEP is the conservation of the organism through the reduction of entropy or, in terms of predictive engagement, the reduction of uncertainty. The organism seeks to preserve itself in equilibrium. This idea fits perfectly with the intention of attunement, coupling, sensorimotor coordination and coordination with the environment<sup>64</sup>. Concretely, the predictive engagement's approach, has expressed a very similar idea under a concept relating to the control of equilibrium: the concept of *homeostasis*.

Counter-intuitively, this concept, with the exception of the enactivist approach (Varela et al., 1991), and especially Di Paolo (2017; 2021; 2022)<sup>65</sup>, has not been used practically at all by post-cognitivism<sup>66</sup>. However it is a concept made explicit precisely by the authors who deal with predictive engagement and the FEP (Badcock et al., 2019; Butz et al., 2021; Bruineberg et al., 2016; Fabry, 2020; Friston, 2010; Gallagher & Allen, 2018; Hohwy, 2018; Kiverstein et al., 2022; Maisto, Friston & Pezzulo, 2019; Seth, 2014).

The homeostatic quest underlies the reduction of human rich activity to a metabolic question. In short, the main idea of predictive engagement is that the self-organised systems that have avoided the states that would cause them to

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<sup>64</sup> "Whether a system of motor or perceptual powers, our body is not an object for an 'I think', it is a grouping of lived-through meanings which moves towards its equilibrium". (Merleau-Ponty, 1945, p. 177)

<sup>65</sup> Let us recall that Di Paolo, along with Dreyfus, Legg and von Maur, is one of the post-cognitivist authors who have insisted on deepening the concept of habit. That is why I am not treating them much in reference to the epistemology of attunement and the epistemology of prediction. I will draw on *some of* their ideas when I am close to Deleuze.

<sup>66</sup> As I am prone to bibliographic research, I can say that the concept of "homeostasis" does not appear in *any* of the papers cited in reference to the epistemology of attunement.

dissipate (i.e. avoided phase transitions away from homeostasis) have been evolutionarily selected (Friston et al., 2006; Friston et al., 2022). This implies that the goal of surviving and remaining functional within physiological limits translates into avoiding the uncertainty ("surprise" or "prediction error") that these transitions entail.

The interesting thing is that, according to predictive engagement, free-energy minimisation offers us a cognitive goal. Or, unconsciously, mathematically reducing free-energy would be the goal of homeostasis. Because according to these authors, the computational and Bayesian mechanism of surprise minimisation is proposed as the mediating mechanism between cognition and homeostatic regulation. But there are several problems here or too many things to be clarified.

The first problem is related to the adaptationist narrative. In a general sense, we find that predictive engagement approaches start by the assumption that the cognitive phenomena under their analyses used to be told as a product of natural selection. I think we can apply much of what I said in an earlier note about adaptationist's restrictive views (§3.1). But a first important point is that *predictive engagement's evolutionary-adaptationist view seems to conflate two senses in which the concept of "prediction" is used* (Anderson & Chemero, 2013). For it is one thing to claim that our brain makes correlations or associations between facts, which we can agree it can be very good at, and another thing is to infer that it is able to create hypotheses of the world (generative models). Both are understood as "prediction", but to understand the former association by the latter operation may be either a linguistic error or something that needs to be explained. It seems that it is the leap from the first to the second sense of prediction that makes the theoretical leap from the study of basic minds to the human system.

However, we can see a second bunch of more precise criticisms, like the ones related to the computation of prediction error. Already from a neuroscientific perspective, predictive processing or predictive engagement has its problems. It is only recently that the idea that prediction error and internal models are encoded by pyramidal cells is gaining confidence; an issue yet to be investigated and widely accepted (Badcock et al. 2019). But even ignoring this fact, Bowman et al., (2013) exemplifies that there are many more mechanisms that shape attention than just the neurotransmitter tuning role in charge of prediction error minimization (Friston, 2022).

Bowman et al, (2013) examples are event-related potentials (ERPs) (i.e., very small voltages generated in the brain in response to specific events or stimuli). The important thing to note is that while the best-known ERPs (such as the N400) jump at oddballs or what differs from our prediction, there is also an important part of attention focused on targeting and enhancing expected stimuli. That is, it is not simply a matter of giving more or less weight to the surprise, as



predictive engagement points out (Clark, 2015), but it is also important to modify attention at a given moment by accentuating it. It is tremendously useful, for example, to focus on looking for what I want and for this, there are also other ERPs such as P1, N1, N2pc, P3 (Luck, 2006) that, far from minimising surprise, heighten responses to predicted stimuli. These are ERPs that predictive processing theory has not yet been able to accommodate (Bowman et al., 2013, p. 207). This is in line with other analyses that do emphasise the activity of neurotransmitters, such as those in the mesocorticolimbic dopaminergic systems, which are involved in rewarding prediction error hypothesis *but also in incentive salience* (Bowman et al., 2013, p. 207; Colombo & Wright, 2017).

And yet another twist can be added to this. For, on the other hand, the usefulness of concentrating the attention also appears in wide range of cases in which human beings dedicate themselves to activities that have no value for survival, such as, for example, painting<sup>67</sup>. *In these cases, nuances, precisions, tonalities seem to emerge out of nowhere. Salience is here enhanced against the idea of reducing surprise.* To be a specialist is precisely to sharpen one's senses. There are examples of non-adaptations and examples of cases where the surprising or the new is what our attention seeks. But crucially, this attention mechanism of surprise-seeking is closely linked to habit. How can we continue to treat habit as a process of sensory-motor routine, of mechanisation and repetition of the same thing, when attention itself shows us that, on the contrary, *habit is a process of continuous specialisation that allows for deepening and differentiation?*

But leaving this aside for now, there is a third group of criticism of predictive engagement that came from a more theoretical point of view. Perhaps the most important is Menary's (2015), who has drawn attention to the fact *that predictive engagement is not applicable to temporal scales greater than the perceptual instant*, to the "now". As I said in the previous discussion regarding the richness of human thoughts, predictive engagement makes it difficult for us to accommodate different intentions, goals, or interests that require us to move on broader temporal scales. Is not the human being precisely a being characterised by proposing unrealisable, even inhuman, goals, not to mention moral or ethical goals that are abstracted from the time of a life? In other words, even assuming that predictive engagement considers that our current perception depends on a history of interactions that reflect a situated agent, in terms of its computations, this historical genesis is only valuable for evaluating the *here and now* and, specifically, for the resolution of present perceptual problems. Indeed, the claim that there is a focused study over a cognition that is concerned solely with "perception", "task-relevant engagements", "attunement", is repeated here.

As I said in the previous discussion, it was precisely Rietveld et. al (2018), participants in predictive engagement, who could bring some light within

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<sup>67</sup> Painting's example is a frequent one: Dennett (1991, p. 53); Noë (2004, p. 166-167); DeLanda (2021, p. 67-68).

attunement as they were concerned with the dimension of cognitive richness and variety of life forms. After all, the above seems to be aimed at systems like basic minds and these authors want to go a step further. However, I already pointed out that their proposal still falls back on the ideology of coordination and harmony. For Rietveld et. al (2018) and other authors close to them, we end up tuning to a particular use of affordances through a complex pragmatics ultimately based on trial and error. Moreover, their work was a proposal to be developed over the next few years, so we could not analyse any clear example. However, at least I join in their line of concern beyond mechanisms reduced to survival, but dealing with the complexity of real life and, in short, with what we could distinguish (with von Maur, 2021) as wide-term fitness and not just short-term fitness.

In short, it can be accepted that homeostasis is an adaptive feature, but homeostasis may have nothing to do with forms of adjustment, coordination, harmony or with forms of *minimisation* of information adjustment when we leave basic systems or artificial agentialities. As I said in the first discussion, "It is one thing to see in retrospect this coordination as a contributing factor and another as the present *teleology* ("the goal") of any cognitive and agential process".

There are alternatives to this simplistic view based on fine-tuning dialectics and optimisation. Thus, for example, Di Paolo (2017; 2022) (as we shall see later with Deleuze's dynamic theory), emphasises that the sensorimotor history of biological agents must necessarily include passing through phase transitions that open it up to new problems and new solutions. But these transitions will not be fully modelled by a system that always returns to the state of equilibrium, because in returning to this state, it "forgets" what has happened in these transitions. For human adaptation, therefore, it is vital that the principle of asymmetry between the environment and organism is always fulfilled (Aguilera, 2021; Di Paolo, 2022; see also Biehl et al., 2021). *This implies that the exchange of energy might not restore to the same exact equilibrium point but to a new state. In fact, asymmetry is a principle that emerges precisely from the energy dissipating tendency (of living beings), and not of its resistance* (Aguilera, 2021).<sup>68</sup>

In fact, against FEP, more scholars endorse the theoretical criticisms and argued against the idea that equilibrium or coordination that prediction serves are the sole principle governing biological life (Anderson, 2014; Di Paolo, 2022; Froese &

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<sup>68</sup> I would like to add a note whose complexity is beyond the present proposal but relevant nonetheless. In fact, in the field of physics, specifically studying the relationship between biophysics and thermodynamics, the prominent research of J. England (2013) points out that the preconceptions of the definition of life as resistance to the second law of thermodynamics may be completely the opposite. Living things are the most efficient way to maximise entropy, in fact, perfect accelerators! Animals convert large amounts of energy into even larger sources of consumption and heat: our complexity makes us perfect energy dissipators. On the bacterial scale alone, self-replicating biological systems in the act of reproduction already show this tendency, which is in turn harnessed to propagate in quantity.

Ikegami, 2013; Menary, 2015; Raja et al., 2021). While not criticising the entire FEP head-on, they open up the possibility of a plurality of principles governing life, instead of one. Nonetheless, on the other side of the spectrum, other philosophers insist that it is possible to unify agential mechanisms under FEP, especially to apply it to the design of artificial agents (Kirchhoff et al., 2022).

Adding to these objections against the attempts to unify FEP with post-cognitive agents (most of them are the enactivist perspective of Kirchhoff, Rietveld, Kiverstein, Gallagher or Bruineberg, among others) I suggest that they are confusing two senses in which “meaning” can be given. *They conflate two meanings of "meaning"*, as illustrated by the phrases "meaningful life" and "meaningful proposition", as DeLanda (2021, p. 59) puts it; the former close to the purpose and the latter to the content. Just as it seems intuitive to us not to confuse what has no value with what has no meaning, we would not conflate senses of meaning in agency. It may therefore seem strange why the enactivist defence of sensorimotor perception of affordances jumps from explaining how organisms value the environment for survival to the erroneous conclusion that meaningful *content* can be identified with the exercise of this interaction (p. 59). Hutto & Myin (2013), radical enactivists, were already alert to this, but their positive proposal did not go beyond basic minds. However, these last clearly assume that different explanations have to be given for the processes that generate value and those that generate content.

I am against, and §4 proposes an alternative, to think that the meaning, value or purpose of agency, is exclusively homeostasis (this is an effect, a phase, a precarious step, I will say), but the most striking thing is that, despite accepting this sense of seeking balance, these theories strive to jump the distance of “the double meaning of meaning”, which very often confuse, hiding one under the other. In the end, this double consideration of meaning can be equated to the double consideration of the concept of "prediction" (i.e. having associations vs. generating hypotheses), and in turn to the distinction between basic minds and cognitive richness. But this duality even seems to be influenced by the implicit habit-goal dualism, which maintains a habit as something mechanical, routinised, subjected to imposed goals and only a product of the laws of correctness and reward. Perhaps despite all the dualisms overcome by post-cognitivism, it is that of the habit-goal that has gone unnoticed and continues to cause the most theoretical strifes and dramatic consequences.

But be that as it may, the FEP follows, or even extremes, the normativity of human cognition focused on coordination, attunement, task-relevant engagements and adaptationism. Here again, my usual disclaimer: my position is not to criticise these advances or that these mechanisms do not exist, but to criticise the limitations of conceiving the focus of cognition exclusively on this.

## (Discussion 6) The Problem of Motivation

A. Clark (2013), undoubtedly an important figure of predictive mind approaches, already pointed out in the last words of his article that accounting for human complexity cannot jump directly from the basic principles of action and orientation of predictive processing. He says that perhaps a multiple hybrid approach is required in which prediction error minimisation only plays a part (p. 201). Badcock et al. (2019) make the same point: the FEP only imposes relatively modest (information-theoretic) constraints on neural structure and function, leaving ample room for evolution and development to produce a wide array of idiosyncratic (free-energy minimising) strategies. Accordingly "it [FEP] also demands recourse to substantive research in psychology (and other allied sciences) to elucidate the distinctive ways in which this principle manifests in humans" (Badcock et al., 2019, p. 1333). However, for both, there are no further developments of this idea to date, other than the continued advocacy of predictive processing and FEP.

The case was that already in the early days of predictive engagement there was a discussion regarding the principles of agential movement. There was a popular counterexample to the argument that agents aim only to minimise prediction-error. And some explanations were offered against that argument. The counterexample said: if an agent's fundamental principle is to minimise prediction errors or minimise free-energy, why does not the agent place itself in an extremely predictable environment such as *a dark room* or even provokes its death?

The most straightforward answer immediately given to this is that living things have normalised itinerant and exploratory behaviour in order to survive in such a changing world (Friston 2010; Friston & Kiebel, 2009). The widespread answer is that a dark room, suicide, or other forms of minimising surprises such as stereotypic self-stimulation or catatonic withdrawal from the world (Froese and Ikegami, 2013) are not a solution because there is a deeper desire for survival and reproduction. In fact, inside the predictive engagement framework, the dark room hypothesis is used to account for depressive or autistic behaviours. This is because these behaviours are considered a disruption of the neurosynaptic mechanisms that execute the correct evaluation of the surprising stimuli of the world and the coherence we give them (Fabry, 2020; Friston, 2022). For example, to say it very briefly, depressive and autistic symptoms express the need to hide from threatening stimuli or overstimulation.<sup>69</sup>

In this sense, the dark room scenario seems easily countered by the exploratory thesis. Nevertheless, the discussion does not end here. C. Klein (2018) opposes it head-on. He asserts that the dark room problem uncovers a much deeper motivational problem: "The difficult question is not "why do organisms like us

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<sup>69</sup>More detailed explanations to these behaviours and to others such as schizophrenia or anxiety are given in Friston (2022).

*seek food* rather than dark rooms?" [...] The difficult question is really "why do organisms like us *seek* anything at all, rather than just sitting quietly?" (p. 2543). Which is the challenge facing any theory about the motor of agency.

Personally, I think it is not necessary to read Klein's critique by entering into deep or metaphysical considerations. In my opinion, Klein's motivational problem shows that the darkroom counterexample implies a very uncomfortable critique. Namely, that *the dark room scenario helps to point out that the FEP and prediction error can be temporarily put in brackets*. Because, even if held the hypothesis that experimental or exploratory behaviour is not an end in itself but serves precisely the ultimate goal of acquiring knowledge in order to reduce error afterwards for adapting and reproduce, it is clear that *there is a moment when survival, equilibrium, grip, reproduction or free-energy minimisation do not operate in the short term*. And the question is: *what operates at that moment?* What perceptual, affective, active mechanisms, that is what cognitive mechanisms, are at work then? So, why to insist only on FEP when asking questions about cognition? Or what is even more radical: is the survival principle something different from the principle of minimisation of prediction error, which is more fundamental than the other?; if survival is more fundamental, as indeed our bare intuition seems to tell us, then what exactly is the FEP contributing in scientific terms?

Be that as it may, what is clear is that although curiosity and exploration were already factors considered by predictive engagement, the truth is that only very recently has special emphasis been placed on how to integrate them within its proposals (Badcock et al., 2019; Bruineberg et al., 2018; Friston, 2017, Friston et al., 2017; Gallagher 2017; Kelso, 2012; Kiverstein et al., 2022,; Rietveld & Kiverstein, 2014; Rietveld et al., 2018). In particular, this has been done by conceiving that exploratory activity has the capacity to provide relevant knowledge to improve predictions: it provides "epistemic value" (Allen & Friston, 2018, p. 2470; Badcock et al., 2019, p. 1336; Friston, 2017; Kiverstein et al., 2022, p. 8). This premise would explain that far from seeking the most stable environment for their predictions, organisms engage in a variety of strategies that are not explained by error reduction alone, but means to that end. This would be at the basis of why the world teems with so many diverse forms of adaptive life and employs an incredible variety of adventurous cognitive strategies.

The point is that in order to include the curiosity and exploration aspect, these authors have made two theoretical movements, which I could say are inseparable. One is to shift the theoretical focus over stability to an even larger dynamic of loops: *meta-stability*<sup>70</sup>. The second is somewhat an older gesture, which consists of ensuring that exploration is a very fundamental acquired prior: a *hyperprior* (Friston, 2008; Clark, 2013). If, as predictive engagement says,

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<sup>70</sup> Authors such as Simondon, Prigogine and other authors related to dynamic systems already spoke of meta-stability in the 1950-60s, and Deleuze's analysis was based on them.

prediction errors are modifying or securing priors or presuppositions, on a high and abstract scale endowed with great certainty we would find presuppositions about how the world works. These are very stable assumptions that our organism makes in relation to world's physics, such as "time moves forward" or "on our planet, all objects fall towards the ground". Thus, it would be the evolutionary hyperprior of "all animals explore new environments when found difficulties to survive"; it is somehow like a Kantian apriori on evolutionary terms, which we cannot determine when it started.

Both gestures aim at including exploration under the optimisation premises of predictive engagement in metaestable terms. According to this, experience and prediction has to help us weigh whether in a particular case it is more convenient to carry out an exploratory behaviour that provides epistemic value or to use instead our preconceptions. Thus, agents do not exclusively seek known homeostatic points (an known equilibrated coordination of affordances; that include, p.e., interoceptive, motor, morphological and environmental affordances), but that in exploration they may find better ways of coordinating affordances and succeed in adaptation (Badcock, 2019; Bruineberg et al., 2018; Gallagher, 2017; Kiverstein et al., 2022; Rietveld et al., 2018). Even so, as I have already pointed out on several occasions, this is a whole field to be developed, which for the time being remains only theoretically emphasised but its most developed models are only applied to basic minds.

In fact, I believe that from one of the few developments in predictive engagement whose experimentation has moved further away from metabolic planes or computational simulations with basic minds, one can read between the lines a rather interesting and paradoxical conclusion about the normativity of insisting on the FEP. I am referring to the field of computational psychiatry, and specifically to *the entropic brain theory* (Carhart-Harris et al., 2014; Carhart-Harris & Friston, 2019). The combination of FEP and predictive brain theory in computational psychiatry have successfully modelled some psychiatric symptoms. Its basis is that abnormalities in neurotransmitter flow in the brain is correlated with a persistent discrepancy between the brain's expectations and perceived reality. Thus, for example, schizophrenia may be related to an overactivity in the generation of erroneous predictions and a decrease in the brain's ability to correct these predictions; or depression may arise from a decrease in the brain's sensitivity to reward signals and a decrease in the brain's ability to generate and update accurate predictions about the outcomes of actions (Friston, 2022).

Under this basis, Carhart-Harris et al. (2014, 2016, 2023) has studied altered states of consciousness through psychedelic substances. His idea is that these substances, especially by affecting a serotonergic receptor, have a strong impact on the neuronal hierarchy that is supposed to be in charge of the correct functioning of prediction error detection and subsequent adjustment of the model. Carhart-Harris speaks of a flattening of the hierarchy with these

substances: a state he calls “anarchic brain” (Carhart-Harris & Friston, 2019). During anarchic brain activity, according to predictive engagement models, the agent dissolves its consolidated structures and gives way to a disorganised dialogue between external stimuli without any correction. Temporarily disrupting these brain networks and producing a reorganisation and rebalancing of them could explain some of the therapeutic effects of these substances in the treatment of mental disorders such as depression, addiction, anxiety and post-traumatic stress disorder, which are overly dependent on preconceptions and rigidity (Carhart-Harris & Friston, 2019; Friston, 2022; Yaden, et al., 2021).

With this evidence, the principle of motivation for an optimal behaviour, held by FEP and predictive engagement, is diluted. FEP and predictive engagement argue that exploratory behaviours exist but just as a means for the real goal of survival and entropy reduction. But Carhart-Harris studies lead to other questions. Does there really exist a strict dichotomy between a proper prediction error organisation and an “anarchic” organisation? Where is this paradigmatic optimal case? It is clear that this anarchy is an induced and extreme state. But when pathologies are described from the FEP, they are described from an optimal point according to a proper hierarchical brain organisation. Of course, deciding at which point abnormal mechanisms harm oneself and those around without one's will is a medical criterion. But *if it is done from the theoretical point of view of a free energy reduction, it is offering a normative dualistic criterion of proper-state and anarchic-state where in fact there really is a continuum of brain states between anarchy and optimal*. All in all, this points to the same normativity where harmonical and task-relevant engagements are seen as the optimal task for which cognition has to be described. But the conclusion from all of it is that exploration may not be a means for correct adjustment, but rather that exploration, or diversity of behaviours, could be explained (even through a model based on error-prediction reduction) by non-hierarchical mechanisms that do not seek any optimization.

With this in mind, an appropriate posture should consider that instead of studying/describing “proper” cognition, we might work with none or both extreme cases (neither attunement and prediction, nor anarchic) in a variety of daily life circumstances. When considering this issue even in terms of proper or patologic cognitive functioning, we may find that slightly idiosyncratic mechanisms are at work in all of us. We can say that none of us work optimally at all. Take for example the case of autism: the one who spends a lot of time in seclusion for the sake of reading, spending hours at the gym or socialising with a limited group of friends and no more; all of them can be seen as anomalies and forms of risk-avoidance that will depend on its degree of implication in those activities what will be considered disruptive for one-self. But all in all there is a continuum. Therefore, *I fear some theorists might be falling into the tautology according to which the FEP is the optimal or the balanced, because the optimal or the balanced is the FEP*. The FEP may offer one explanatory mechanism of

cognition, but taking it as the focus, or worse, taking it as the only principle, can lead us to extremely normative positions. In view of this, the following (§4) will offer a proposal that avoids such normativity.

For the time being, I am going to propose *an immanent theory of exploration*. The following proposal will avoid the problem of goal-driven intrinsic motivation. *Because, I consider that the aforementioned problems of motivation follow from implicitly supporting the habit-goal dualism*. Instead, my aim is to expose that habit is not a mechanical product, a residue resulting from a series of dynamics, but rather habit is a first active and generative step. For this, I am going to go to Deleuze. Deleuze's theory, worked on between the 1950s and 1980s, does anticipate the classic proposals of post-cognitivism, but also these latest works on predictive engagement and metaplasticity. However, I insist that he does so from a perspective that has remained outside the history of the cognitive sciences and, therefore, totally outside the history with which the idea of habit and the habit-goal dualism has been maintained. Perhaps that is why it implies a different normativity with which to complement the present, if we are in time.



## 4. Deleuze on Habit: Beyond Prediction

*"If the intention is to disseminate information, why all this noise?"*  
Mark Fisher (2004).

The philosophy of G. Deleuze (1925-1995) has been absolutely on the margins of cognitive science, including post-cognitivism. Consequently, its normativity has also been on the margins of the developments in this field. Deleuze's proposal, produced on many occasions in collaboration with F. Guattari, *is a marginal proposal that is precisely about the margins of cognition.*

Deleuze's philosophy coincides with (i.e., anticipates) post-cognitivist proposals about an enactive, embedded, scaffolded, affective, social, plastic, collective, dynamic and metastable agent. However, my way of introducing Deleuze's thought into the cognitive sciences is by touching on what I have been showing to be the core of post-cognitivism: *Deleuze also participates in a habit-based epistemology, but in one that completely dilutes the habit-goal dualism.*

Throughout this thesis it has been pointed out why it is so informative to characterise post-cognitivism as being fundamentally a habit-based epistemology (§2.1) and why this is a historical development (§2.2). In turn, it has been argued that the kind of "habit" that post-cognitivism carries with it has remnants of a behaviourist and computational pragmatism that distinguishes between habits and goals, which is a distinction present even in the most radical anti-cognitivist authors. With this, I have gone on to analyse what normative consequences this conception of habit has for the study of cognition. In short, I have dismembered the habit-based epistemology hitherto adopted into an "epistemology of attunement" (§3.1) and "epistemology of prediction" (§3.2). There I have shown a post-cognitivist philosophy centred on questions of metabolism, basic minds and adaptationism... but above all, it continues to work for a cognition exclusively occupied in task-relevant engagements and harmonious encounters in search for equilibrium. In short, it focuses on a cognition concerned exclusively with the prediction of events that can help to overcome setbacks which recently, it has based these presuppositions on *the free-energy principle*, arguing that agents' goal is to overcome thermodynamic disorder and entropy.

To sum up, under these assumptions of this particular habit-based epistemology, which I have sometimes called "a Watsonian conception", hides a post-cognitivism which, under an epistemology of attunement and prediction it encounters different assumptions of what cognition is and how to study it: 1) a focus on adjustments and dynamics that serve to adjust, 2) a focus on an adaptationist and not entirely Darwinian view, 3) a focus on task-relevant and/or harmonical engagements, 4) a problem of explaining the motivation with which cognitive agents pursue goals, 5) a reliance on the fundamental principle of entropy reduction or the search for homeostasis supported by the principle of free

energy minimisation, and 6) a dramatic implicit or explicit division between habits as the mechanical residue of interactions and goals as cognitive objectives and the engine of restlessness.

In the face of this, here I want to argue that Deleuze starts from a totally different habit-based epistemology. In Deleuze we will find Darwinist, pragmatist, embodied, situated and ecological traces as well as ideas close to dynamic systems theory. But remarkably, his thought manages to bring these approaches together, while insisting on the relevance of a non-mechanistic philosophy of habit close to what we find in Darwin, Peirce, Heidegger or Dewey. After all, as I showed in the historical drift (§2.2), *has not post-cognitivism retained much of these authors, except, precisely, their chaotic and creative notion of habit?* With Deleuze the opposite is true, we find that habit is elevated to an ontological mechanism, and it is precisely a flexible, changing, performative and unpredictable mechanism that promotes both organisation and disorganisation.

To this, it should be added that the importance of habit is gaining momentum in recent years across the whole spectrum of cognitive sciences, as reflected in Maisto et al. (2019), Kiverstein et al. (2022), or in the handbook "*Habits: Pragmatist approaches from cognitive science, neuroscience, and social theory*" by Caruana & Testa (2021). Or as I pointed out on a previous occasion, even when Microsoft (2023) defends its latest technological developments in AI, it makes explicit a particular conception of human habits<sup>71</sup>. In this sense, given the current importance of habit, ignoring a debate on the concept seems more than just a matter of neglect.

So, to situate ourselves, I would like to introduce directly the characteristic notes of the habit that will be developed here. These will be revealed not so much as my own but as extrapolated from Deleuze's conception:

1. *Habit is the process of deepening.* By repeating itself, habits allow us to specialise, namely, to experience new perceptual nuances and new action opportunities. She who habituates focuses on something hitherto invisible.

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<sup>71</sup> See p. [62]. [As an example of this habit-goal dualism I bring a personal case. As I am writing these pages, on 16/03/2023, a Microsoft event presents their new advances made together with the artificial intelligence lab OpenAI. Among these advances is the integration of language processing artificial intelligence Chat GPT-4 as a "copilot" into their *Office* suite of word processing, calculation and slide programs. All you have to do is type in natural language what you want, and in a second a 30-page essay on your topic, 20 slides, or the presentation of the calculations you would like to perform can appear. In this event, the Corporate Vice President, Jared Spataro, (or an avatar of him) tells us their vision of the future of work: "The reality is that people spend a lot of time on drudgery work and tasks that zap our time, our creativity and our energy. *We become separated from the soul of our work*". To this end, the copilot comes to solve this, so that we can go directly to creativity, to our goals. That is, Microsoft clearly understands a difference between the usual and routine part versus that which "feeds our souls". It not only participates in a mechanical conception of habit, but consequently polarises it with the goal and, moreover, believes that it is what holds us back. This habit-goal dualism is position in complete contrast to the version of habit that we propose here. ]

2. As habits are processes of continuous specialisation, therefore are of *differentiation*. It is never an exact repetition.
3. Thus, habits are actions that enhance the *growth of life forms* and cognitive richness. Habits are thus a mechanism that goes beyond the usefulness of adjusting the agent to the environment in social or biological terms. Contrary to what it may seem, habit is a mechanism of expansion of the field of possibilities and of differentiation.
4. Philosophically, if we focus on the acquisition of habits and the effects of those, *we move from an externalist to an immanentist approach of cognition*. That means that Deleuze's approach does not start from a given cognitive subject and then expands the variables that affect his cognition (for example, by adding the variables of the morphological, social, cultural, interoceptive, affective dimension...). The embodiment and situatedness of the agent appear as habit's unfold: approaching the subject's complexity is not a question of "adding epicycles". If we place ourselves within the habit, it is the complexity that appears when we see its deployment.
5. On the back of this, Deleuze's habit brings an explanation of the development, specialisation and differentiation, of human behaviour and cognition as an unfolding. Therefore, it does not need any teleology or motive or goal external to the action of habit.
6. Ultimately and more importantly, it is *against the habit-goal dualism*. Particularly, it is against the view which sees habit as the optimised residue of other creative and goal-oriented cognitive functions. Therefore, it is against the view of habit as a mechanical, routinized, automatical and inflexible mechanism. So, Deleuze contributes to conceiving habit as an intelligent, flexible, unpredictable and context-dependent process. That is a Darwinian view of habits instead of a Watsonian one.

It is true, authors such as Dreyfus, Di Paolo, Legg and von Maur, as well as the papers by Sutton et al. (2011), Kaufer & Chemero (2016), Miyahara & Ransom (2021), Hutto & Robertson (2021) or Cappuccio & Ilundáin-Agurruza (2021) have treated habit in the latter sense. In a way (and here I also include the pragmatist philosophers and phenomenologists of the early 20th century), those thinkers who have most made explicit a philosophy of habit have been those who have most defended its creative capacity. However, in my opinion, their proposal has not been totally detached from the presuppositions of attunement and prediction, at least not in the way Deleuze did more than 50 years ago.

Therefore, it is a matter of rereading the post-cognitivist paradigm from other assumptions. On the one hand, Deleuze anticipates much of post-cognitivism and it is surprising that it has not been used at all. On the other hand, with Deleuze we move towards a cognitive philosophy that deals with the elements that remain outside the mechanisms of survival, adjustment and prediction. With Deleuze we move towards a philosophy of the possibilities of cognition and away from a philosophy centred on the useful and adaptive.

## General aspects of G. Deleuze's Philosophy

Before introducing Deleuze in the field of cognitive science, let me set out Deleuze's general philosophical ideas. G. Deleuze is renowned in the history of Western philosophy for turning around the metaphysics upheld by the great names of this history, whom he criticises for participating in a metaphysics based on the "*dialectic of identity*". According to Deleuze, from Plato and Aristotle to Descartes, Kant and Hegel and others, the goal of philosophy is to comprehend the world as one or other universal identity. In this sense, differences are seen within a horizon of some present or future unification or synthesization. Hence, differences are always epistemologically and ontologically seen as subordinated to identities. Against this, he demands the relevance of differences over unifications and generalisations. Everything that exists is positive.

Influenced by H. Bergson, Deleuze argues, especially in his work "Difference and Repetition" (1968)<sup>72</sup>, that generalisations are illusions created by a traditional philosophy that seeks to establish control over reality. Thus, the *dialectic of identity* is expressed when there is an insistence on reducing complexity into units, objects, individual entities or necessary laws. This translates into a characteristic vice of political, scientific and philosophical thinking, whereby societies impose artificial and standardised concepts on our understanding of the world, reducing the complexity and diversity of reality to simplistic structures. In this way, systems are often created in which what is different is seen as a threat to harmony.

What brings me here is to propose that the dialectic of identity is present in any approach of cognitive science that considers that the activity of cognition is only oriented towards the reduction of diversity and aberrantness since the only cognitive goal is the tuning, optimisation, adaptation and prediction of the agent to the world.

Contrarily, for Deleuze reality is first and foremost a space of differences and multiplicities in constant change and movement. Thus, cognition equally follows these laws. Cognition is not the magical exception that seeks exclusively to resist chaos. Conjunctions, coordinations, co-operations and equilibriums do indeed appear, but they are the product of chance or are moments of transit of an even greater process of diversification<sup>73</sup>. Deleuze thus proposes an alternative to the dialectic of identity. Instead of seeking unity and identity, Deleuze proposes to celebrate diversity and difference as what makes cognition rich and complex.

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<sup>72</sup>The books after *Difference and Repetition* can be said to be applications of the philosophical arguments therein to different fields dealing with the production of social, psychic, organic and artistic structures.

<sup>73</sup>"Negation results from affirmation: this means that negation arises behind affirmation, or alongside it, *but only as the shadow of the deepest genetic element*" (Deleuze, 1968, p. 100, my translation).

To this end, Deleuze advocates rhizomatic thinking or "*rhizome*" (1980). This represents both a form of social organisation and a form of cognition in which the ideas and activities of agents connect, collide, propagate and influence each other without law or order. Rhizomatic organisation emphasises the spontaneous assemblages and conjunctions that occur between various hierarchical organisations. In cognitive terms, Deleuze claims that cognition does not focus on completing concrete tasks for attunement, but that elements belonging to interoception, affectivity, perception, memory also enter, exit and link up in cognition without any deliberately useful meaning, and this has repercussions on ways of behaving and modifying the environment. These creates a kind of anarchic and casual *participatory sense-making*<sup>74</sup>.

To summarise, Deleuze defends the rhizome as a real process of living organisation, but this "anarchic" form of thought is but the extreme opposite pole to the other image of thought which is the prevailing *philosophy of identity*. Both extreme views, indeed, find evidence. But it is a biased view to attend to only one. In the cognitive case we are concerned with, for example, it is just as extreme to draw definitive conclusions about what cognition is by studying an 'anarchic brain' via altered states of consciousness induced by psychedelics (Carhart-Harris & Friston, 2019) as it is to endorse a rigid perspective that understands cognition as a mechanism of survival, harmony or tuning to task-relevant engagements, among many other assumptions of prediction and attunement. Ultimately, Deleuze suggests that the way we understand and organise reality is limited by the image of hierarchical and structured thinking that permeates politics, science and philosophy. Instead, we must seek new, non-linear and connected ways of thinking in order to expand our understanding of how cognition works.

## **The Intensive and the Virtual Field: Deleuze and Dynamical Systems**

The critique of the dialectic of identity sums up Deleuze's philosophical project. But to understand Deleuze's conception of habits, I need to describe his "*ontology of difference*". I will therefore enter briefly into abstract terrain, but this will be useful. Moreover, these ideas put Deleuze in clear dialogue with the post-cognitivist theories that, based on the theory of affordance, error minimisation and dynamical systems, are using very similar concepts to Deleuze's (See Case 3 in 3.2)<sup>75</sup>. After all, we can also read Deleuze as a

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<sup>74</sup> Deleuze's philosophy has been criticised as obscure and irrational by analytic philosophy (see, notably, Sokal & Bricmont, 1997). His writings not only contain complex metaphysics along with a profound knowledge of the history of philosophy, but also combine chaotic, but by no means ill-founded, references to a wide variety of scientists, philosophers or artists. If this were not enough, to the despair of the more analytical, his writings have attempted to put rhizomatic thinking itself into practice, so that his books are understood as open machines and not as hierarchical or dogmatic expositions.

<sup>75</sup> See "2nd Discussion: Epistemology of Prediction" (§3.2) for their version of *metastability*.

systematiser of Peircean, Darwinian or Husserlian metaphysics, under the premises of dynamical systems theory<sup>76</sup>.

To begin with, the most important thing about Deleuze's ontology is that in it we find the *intensive field* and the *virtual field*. These fields refer to an ontological dimension that exists beyond the perceived reality or *actual field*. These two fields are composed of intensities and potencies that are not perceptible to the naked eye, but are in constant movement (Deleuze, 1968; DeLanda, 2002).

The intensive field belongs to physics. It describes the differences in intensity between things. *Intensities* are not things in themselves, but are the flow of energy between things. In fact, they are the flow of energy between affordances. In an interaction between entities, there are many kinds of intensities, for example: temperature, velocity, density, concentration, pressure. Intensive properties are the opposite of extensive properties, they are properties that cannot be divided (the sum of two 50cm made up 1 metre, whereas the sum of two 5° doesn't make up 10°C).

But crucially, intensity only occurs in a relationship. For example, the temperature of something is relative to the temperature of another thing, or to the environment as a thing; essentially it does not have any temperature. Moreover, temperature is flowing (is changing) according to the temperatures of other things, or according to the environment as a thing, hence the flow of intensities. In this sense, intensities are neither objective or subjective, they depend on relations. Another example: the intensity of a colour is not found in the colour itself, but in the structural relationship between the wave spectrum of colour, light, the perception of the human eye, and its contrast to other perceived colours.

All in all, intensities are closely related to what affordances theory suggests (Gibson, 1979; Rietveld et al., 2018). Intensity relates to our ability to affect and be affected by things: intensities such as weight, velocity or density depend on the relationship of a body in relation to the other bodies. But importantly, to all this, *Deleuze's added point is that the structures that sustain each of these bodies that are in relationship to other bodies are at the same time a structure of "smaller" affordances built up by intensity flows*, so, p.e. the processes that happen in the biochemistry inside our body.

The virtual field, on the other hand, is even more abstract. It refers to a plane of reality that contains intensities' *critical points*. It is a space that theoretically contains all possible contrasts for a given intensity. And among those critical points are *singularities*. Singularities are very particular points/states/moments: they are either invariant, i.e. they are concrete points through which several different systems pass independently of their particular physical mechanisms; they are critical points where intensities become zero (acceleration, velocity,

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<sup>76</sup> I highlight the work of Protevi (2009, 2010, 2011) and DeLanda (2002, 2021) as those closest to integrating Deleuze into cognitive science from dynamical systems theory.

condensation...) become zero; or they are points of bifurcation or emergence (100° C for water) where the dynamics of the system change.

In short, the virtual field is a theoretical space of critical points for intensities.<sup>77</sup> Now this is crucial. Deleuze's next step is to claim that *when a particular set of critical points which can form a structure get actualized, they can form a circuit through which intensities flow. This "closed" circuit or structure is what we observe as a self-organised structure (that is, an agent).*

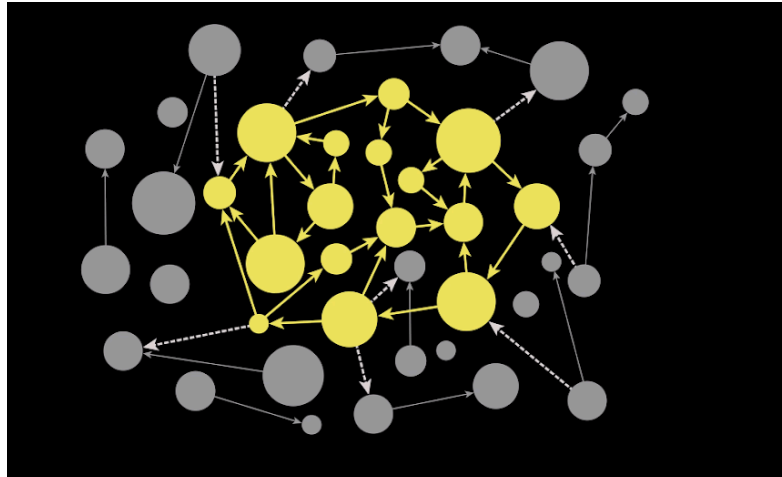
Deleuze argues that the virtual field is as real as the actual field, since it is an ontological dimension that exists and affects perceived reality. However, the virtual field has nothing to do with an essential field or with essences lie; like in a platonic sense. Because the virtual field is in turn affected by what happens on the actual and intensive plane<sup>78</sup>. In Deleuze's philosophical terms (somewhat ironic with Platonic and Hegelian concepts), the points in the virtual field are considered "Ideas" (" $dx$ "). But they are only actualised through the determination of actual differential relations of intensities (" $dy/dx$ ") (Deleuze, 1968, p. 87). Neither  $dy$ , nor  $dx$ , of the virtual plane, have value in themselves if they do not enter into actual intensive relationships. That is to say, what constitutes the virtual and actual world are the processes of the intensive field which are nothing but *linked rates of change* (Protevi, 2010, p. 422).

In short, *the differences between intensities are the fuel, the engine, the movement, the driving force of the becoming of the world.* Thus, the difference between intensities that get related are at the basis of any kind of movement or tendency, and when these flows are trapped in concrete circuits of affordances and singularities, we observe organised structures or agents, although at bottom there are only more or less complex flows of intensities. These circuits can be called *operational clusters* (see Fig. 1), absolutely in line with enactivist conceptions. In this sense, it is important to note that for Deleuze this extends to all forms of life and organisation. This will be crucial for understanding the formation of habits.

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<sup>77</sup> To understand what the virtual field represents, it is useful to imagine it as a topological space that maps affordances and singularities. Like a mathematical abstract space. Concretely, it is useful to turn to the concept of *manifold*. This concept was proposed by the mathematicians Gauss and Riemann when introducing the differential geometry calculus to which Deleuze constantly refers. Given the typical problem of observing the evolution of geometrical properties, the classic theory opted to calculate it by assuming a coordinate space of as many dimensions as the object plus one dimension for the container space (a cartesian plane). However, by replacing the use of algebraic equations with differential equations, it is possible to study this without needing a more global surface to contain it: this is the *manifold*. Deleuze's multiplicity or virtual field is comparable to the manifold: its dimensions can evolve and it has no higher dimension to contain it, that is, it can be studied immanently.

<sup>78</sup> Hence, the image of a manifold is more accurate as the manifold evolves.



**Fig 1.** The concept of operational closure points out that in an exchange of energies in all directions, a closed structure emerges which does not cease to constantly give and receive with the environment. It is a well-known concept to enactivism. However, I emphasise that operational closure can be applied to the most fundamental intensive field as well as to very large structures above the human scale. Thus, following Deleuze's ontology, the circles symbolise affordances, i.e. the circles are virtual critical points. In contrast, the arrows represent possible flows of intensities. Only actual intensities form actual structures. Dotted arrows indicate energy flow that passes through the circuit, but are not considered constituents. (Image shared at an on-line conference by Di Paolo to discuss sensorimotor clusters, on 18/02/2022).

So with this I have contextualised the philosophy of Difference. Most importantly, in Deleuze, Difference is at the origin in the form of multiple intensities and "pre-individual" singularities. Indeed, "beneath the general operation of laws, however, there always remains the play of singularities" (Deleuze, 1968, p. 25). It is an *ontology in which individualised entities or objects are evanescent, transits, precarious structures, where what is fundamental are movements and relations. That is, where the fundamental thing is the change promoted by the differences of intensity: a change that does not necessarily aim at the reduction or annulment of this difference.*

To summarise, the French philosopher argues that the problem with the classical image of thought is that it takes as the foundation of its systems what are, in fact, the fragile and ephemeral effects of the intensive field. Deleuze, however, tries to move us towards a logic proper to nature where wild differences have ontological priority over the units they constitute. This implies a normativity quite different from that imposed by identity thinking. To this end, many other concepts appear in Deleuze. However, as I say, my intention in bringing Deleuze into a much more direct dialogue with post-cognitivism, that is, a dialogue with its core which, as I have been characterising, is the concept of habit. The ontology presented above is the basis of habit. And this is the subject I am turning to now. So, let me start with a fundamental concept in Deleuze that I have not yet dealt with: what is "*Repetition*"?



## 4.1 Habitus according to Deleuze

Like a photograph, when one puts the image of the thought of Identity in negative, one comes closer to seeing the world under the philosophy of Difference. When this happens, one realises that underneath structures are differences of intensity: and that the structures themselves are a way of altering and intervening the medium by generating new differences of intensity!. To put it quickly, one realises that repetition is not the repetition of the same, but that *repetition is difference's way of differentiating itself*, of distancing itself, of particularising itself... of insisting.<sup>79</sup> I will develop this.

Although Deleuze's thought is prone to be abstract, he was clear that his philosophy was about living structures. In particular, his philosophy wanted to offer tools other than those offered by the vices of identity when considering the kind of cognition of human agents. Thus, a central element in *Difference and Repetition* is "Habitus", which is a totally organic principle and the first visible mechanism of *Repetition*.

For better or for worse, it is necessary to go beyond the abstract and expressive tone of Deleuze's philosophy in order to enter into the more analysable and more directly treatable elements of cognitive science. I therefore propose to distinguish in explanatory terms between a) ontological "Habitus" and b) habits as an organising mechanism of the living being, specifically of humans. Thus, §4.1.1 will define Habitus on the basis of Deleuze's ontology and in §4.1.2 some of their characteristics will be discussed with cognitive systems in mind. As will be seen, dealing with Habitus does not mean moving away from issues that are very present in post-cognitivism; we will see that Deleuze's terminology is very similar to that used by Di Paolo, Rietveld, Kiverstein, Bruineberg or Friston. Even so, human habits will be more explicitly addressed in §4.1.3.

### **4.1.1 *Habitus*, First Synthesis of Space and Time**

Deleuzian Habitus arises from an ontology close to the theory of dynamic systems. For this, Deleuze relies on the notions of actual, intensive and virtual field, discussed in the previous section. Principally, *Deleuze wants to show us that living organisation begins, ends and is traversed by the intensive process of repetition/differentiation*. To explain this, Deleuze, in chapter 2 of *Difference and Repetition*, shows that "the first step" of this ontological process is Habitus. However, it is a first step in the explanatory order, for in fact all the steps coexist. There is no priority of any step because they all participate in step 0 (virtual field or singularities) and step 3 (differentiation itself or "eternal return"

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<sup>79</sup> "Difference is both the origin and the destination of repetition, in an increasingly "powerful and ingenious" movement, which takes "more and more account of the degrees of freedom" (Deleuze, 1968, p. 56, my translation). Thus one observes "imitation as the repetition of an invention, reproduction as the repetition of a variation, irradiation as the repetition of a disturbance, summation as the repetition of a differential" (p. 128, my translation). Deleuze is influenced by the analysis of the sociologist G. Tarde. See his *Les lois de L'imitation* (1890).

of the virtual field). In what follows, I will address various features of habit that anticipate post-cognitivist questions.

### **Defining Habits: Habitus as the Synthesis of Space**

The first characteristic is that Deleuze defines Habitus as a space contraction (Deleuze, 1968, p.124). *Habitus are various "free and chaotic" intensive processes grouped together in a network of critical points.* Habitus is, therefore, an *operational closure of intensities.* This fundamental contraction is present in all kinds of organisation: from chemical structures to social organisations (Deleuze, 1968, p. 125; DeLanda, 2002, p. 132). Therefore, *the formation of an agent is the same as the formation of a habit.* As I will show, in terms of embodied cognition, the contracted network of intensities sets up the map of possibilities/affordances precisely because the morphological structure and the cognitive processes are inseparable. This is how "actually", there is no difference between Habitus and habits.

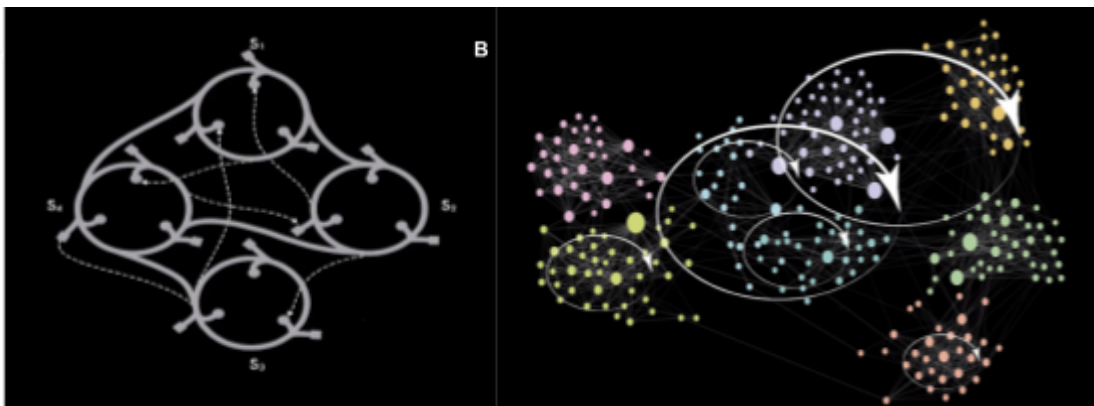
The simplest way to begin to explain this abstract theory is to turn to Di Paolo (2019, 2021, 2022), who, most notably, has recently come to similar terms and conclusions: "Autonomy is grounded operationally in dynamical systems ideas and gives a good illustration of the ontology behind enactive thinking. The constituent "elements" of autonomous systems are always processes, organised patterns of change, intensities, rhythms, and relations." (Di Paolo, 2019, p. 206). In other words, *habits are no less no more than intensities that while moving through attractors and singularities get conducted into more or less closed and repeated circuits.* What turns these circuits or patterns into habit is their repetition, or rather, as will be shown, their *pseudo-repetition.*

So, to put it quickly, habits are circuits between affordances. In the ontological terms exposed before, this means that the value of an affordance ( $dy$ ) is only actualised by the value of what I am for this affordance ( $dx$ ), or rather, both are actualised together: nor  $dy$ , neither  $dx$  has value in itself, only  $dy/dx$  has value. This fits perfectly with Gibson's theory (Gibson, 1979; Rietveld et al. 2018; Heras-Escribano, 2019). But, what is more according to Deleuze's ontology, in turn, is that what composes affordances ( $dy$ ) as well as what composes me ( $dx$ ), is made up of other small relations ( $dv/dw$ ). For example, think about how many sub-structures make up a human body. And we can go down through these structures, down to the most molecular view, where we would only find physical differences in intensity ( $ds/dt$ ).

Interestingly, Di Paolo more precisely applied the same idea of habit as a network of flows of intensities to sensorimotor schemas (2019, 2021). *A habit would be a cluster of several patterns that group the flow of intensities in the interoception, perception and action domain.* Habits are thus clusters of patterns, habits are clusters of operational closures. Habits are therefore a movement, i.e. an action, that forms material events which are really self-sustaining networks.

Or, as Di Paolo would say, habits are clusters of intensive operational closures once they get complex enough to form a closed sensory-motor agency.

Finally, the fact that this set of schemas are precarious groupings, facilitates the switch from one particular configuration of the general cluster to another configuration. In this sense, precariousness is precisely what facilitates that we do not leave the repertoire completely, but instead change its configurations. This means that the set of schemas coexist in a *metastable* way; which in cognitive philosophy is recently considered to be the basis for agency (Di Paolo, 2019, p. 219; 2021, p. 16; Kiverstein et al., 2022, p. 7) (see Fig. 2).



**Fig 2. A.** Representation of the idea of metastability according to the precariousness of the system. Metastability allows moving from one pattern of intensities or habit (S1-S4) to another. In this case, the patterns are expressed as perfectly closed. According to Deleuze (see Fig.1) patterns are not perfectly closed, but operationally closed. Within them, the set of affordances and singularities varies more or less subtly depending on the circumstances. **B.** It serves as a more faithful representation of the metastability of affordances, namely, it represents a virtual field of affordances for an agent at time  $t_1$ . When the current affordances change sufficiently, we move to another set, but this does not mean that the affordances have disappeared from an agent's virtual field. The arrows indicate that all this is in motion.

For instance, let's consider the habit of waking up and preparing a cup of coffee. Within this routine there are certain steps like reaching for the glass and spoon from the familiar kitchen drawers. However, sometimes things may not be in their usual places, requiring us to adapt our sensorimotor routine. Nevertheless, even very early in the morning when, personally, I'm not fully awake, I am surprisingly attentive to the situation. I manage to navigate the context without being overly reflexive or mechanical, and I still complete my breakfast successfully.

That is a small example of "metastability" as Deleuze and post-cognitivism understands it. Moreover, think that equally as that inside a routine there is the possibility to change between sensorimotor routines, routines can also switch from one to another depending on the context. That's the full sense of metastability (see Fig. 2.B) However, there is an element missing in the explanation of metastability as exposed by Di Paolo (and also by Bruineberg, Rietveld and Kiverstein; see Case 3 in §3.2). And the missing spot precisely

relates to why Habitus relates so fundamentally to Difference according to Deleuze.

*The actions of my body are the product of, as well as produce, changes in intensity* (e.g., changes in pressure, speed, temperature, satiation, concentration, etc.). This affects processes that govern our internal *milieu*, but also our external *milieu*, as our action participates in it. This has two consequences. On the one hand is that, as Protevi says, the virtual field (or the field of affordances) is altered, is co-constituted by the action (2010, p. 433). But, on the other hand, in an important sense for understanding Deleuze's habit is that, there can be no perfect repetition, but at most a pseudo-repetitions, since the repetition itself (i.e., the habit, the pattern of intensities) alters my *Umwelt* and alters me. That is, there is no total repetition, because, in the first place, our own habitual actions shape ourselves and our environment, laying the groundwork for slightly different actions. In short, habits based on the  $dy/dx$  relation also explains the foundation of the perceptual-motor dynamics accepted by all post-cognitive: *we are only able to perceive a property because there is a difference of intensity in this property or in comparison to another, and thanks to perception we act and generate another difference of intensity.*

### **Defining Habits: Habitus as the Differentiation of Repetition**

As I said, habits come from contracting an intensive pattern and cannot avoid influencing both its own organisation and that of the outside. In Deleuze's jargon, habits are events of "territorialisation" within a sea of pre-individual intensities (Deleuze, 1968, p. 368; Deleuze, 1980, p. 48). And, in accordance with his pragmatist and expressive philosophy of difference, he will say that there is no gesture of territorialisation, which does not include lines of flight, which does not break stability or which does not produce a collateral effect on a nearby system and destabilise it (Deleuze, 1980, p. 48-78). *There is no gesture of territorialisation that does not bring about a gesture of deterritorialization.* And conversely, there are no chaotic, "deterritorialising" gestures that do not enter into couplings or assemblages that form another "territory". Habitus, then, is a process that finds itself both territorialization and deterritorialization. That is why in Deleuze we find the same principle as in Peirce, namely, that the true principle is not that of contracting habits, but that of the *habit of changing habits* (Peirce, CP 6.101, 1901; Deleuze, 1953, p. 40). In other words, there is no principle of *attunement* or reduction of uncertainty, no attempt to counteract entropy, but a more fundamental principle of complexification that is driven by what most of post-cognitivism assumes to be a process of simplification. *The principle of Deleuze's ontology was not so much that of adjustment as that of territorialisation-deterritorialisation.*

Furthermore, Deleuze considered the extreme interrelation between diverse habitual processes. He does not regard this interrelation as circular feedback

dynamics between levels that, organised hierarchically, tend to adjustment and synchrony. Rather, Deleuze understands internal and external transformations as *the interference* of many different planes (planes such as different cellular and neuronal, material or social organisations that combine in a territory, as well as different cognitive mechanisms such as affect, motor execution or interoception, which coexist internally).<sup>80</sup> He argues that between these planes *clashes, saturations, synchronizations, resonances, amplifications, cancellations and propulsions* also occur. All of these often contribute to further imbalances in the patterns of singularities and, notably, to bifurcations in them that make it impossible for the pattern to be exactly the same. That is, several alternative behaviours (i.e. paths between singularities) may occur where previously there was only one (Deleuze, 1968, p. 123; Friston, 2019, p. 27; Ciaunica & Levin, 2022, p. 5)<sup>81</sup>.

Actually, this picture is further complicated by the fact that Deleuze argues that these relational processes do not always follow a deterministic causality. Recalling the contributions of G. Simondon, J. Monod or I. Prigogine among others in physics and chemistry of structures, Deleuze considers that the structuring of a network of singularities *promotes and arises from physical processes such as phase transitions, saturations, turbulences, interferences, bifurcations and ruptures of equilibrium*. In other words, organisation is traversed by processes *that are unpredictable* from linear mechanics (DeLanda, 2002, p. 23).

In short, as shown previously, habit itself (i.e. a network of affordances or critical points) 1) implies changes inside and outside the network. But, moreover, both 2) in the basic substrate of intensities and 3) in the relationships between different networks of affordances there are non-linear convergences, interferences which produce new coordinations as well as marginal phenomena. With these three points, Deleuze could be surprised by the insistence on the pole centred on coordination and adjustment in the study of cognition.

So far, it can be said that the paradoxes of the history of analytical philosophy mean that although Deleuzian philosophy was considered totally irrational, anti-evolutionary and mystical, precisely some of the ideas that he anticipated about dynamic systems, are recently the most novel basis for addressing the question of metastability and self-organisation in systems far from equilibrium (with explicit references the scientists mentioned above) (Friston et al., 2015, p.4; Friston, 2019, p. 20, 50; Badcock et al., 2019, p. 1328; Di Paolo, 2022, p. 28). However, the present does not refer to Deleuze and continues with a normativity

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<sup>80</sup> In line with it, Di Paolo (2023), is drawing attention to the mistake of getting used to talking about hierarchy between organisational levels.

<sup>81</sup> In dynamical systems theory, bifurcations are produced at "critical values, thresholds of intensity at which a particular bifurcation takes place breaking the prior symmetry of the system. A state space structured by one point attractor, for example, may bifurcate into another with two such attractors, or a point attractor may bifurcate into a periodic one, losing some of its original symmetry". (DeLanda, 2002, p. 11).

oriented towards the reduction of difference. In this sense, these and other authors such as Richardson and Chemero (2014) or Käufer & Chemero (2016), take by default that dynamical systems theory is the useful tool to account for how agents enter into equilibrium with the environment and incorporate elements and affordances to complete functional tasks.

On the contrary, the thesis that Deleuze keeps emphasising is that *these nonlinear events show that the event of grouping simply appears and this goes against any motive or teleology of coordination*. That is to say, grouping happens, yes, and it has very important effects such as the fact that we are now here and generate further collectives. But this is no reason to attribute a teleology to the organisation centred on seeking more grouping, more prediction of uncertainty or more reduction of difference.

Even if it is argued that this mechanism has passed an adaptive filter, this filter cannot counteract the multiplicity and endless field of differences in which the synthesis appears (see discussions on adaptationism in §3.1 and §3.2). Moreover, at the evolutionary level, also other elements such as mutation, genetic drift, horizontal transfer of genetic material between species (as transported by viruses) or by-products are necessary to understand the framework of natural selection; a framework that Deleuze does never criticise when understood in this broad sense (Deleuze, 1968, p. 371; 1980, p. 55; DeLanda, 2002, p. 53).

But above all, the most important thing Deleuze tells us is that there is no need to resort to non-linear physical events or an uncertain evolutionary framework to observe the expressive effects of habit. What is more important, and more directly understandable in pragmatic terms, is that *habit could also never predict the very exercise of differentiation that the process of habit itself produces in its own doing and that reverberates directly to its internal and external milieu*. Habit comes from a change and produces a change. Although the processes that form the habit are trapped in a pseudo-repeated network, the effects that arise from it will always be *necessarily slightly unpredictable*: habit is not one step ahead of itself, *habit is beyond prediction*. Forgetting that habit generates something different is precisely one of the problems of the image of identity within post-cognitivism which, in this sense, is not sufficiently pragmatic: that is to say, post-cognitivism is not attentive to all the effects and consequences of habit<sup>82</sup>.

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<sup>82</sup>Indeed, Deleuze can be considered one of the pioneers with respect to the anti-representationalist question in philosophy of mind, as it is dealt with in one of his first texts, *Empiricism and Subjectivity* (1953). Let us recall that the same year of that publication coincides with the publication of Wittgenstein's great treatise on pragmatics (*Philosophical Investigations*) and with the moment in which J. L. Austin begins to publish the first articles that point to what would later become the basis of performative linguistics, *How to Do Things With Words* (1962). But it is only Wittgenstein and Austin who *officially* struck the hard blow to logicism and representationalism according to the cognitive sciences.

### 4.1.2 Habit as an Event

All in all, contrary to post-cognitivism, Deleuze pointed out that changes does not *aim* at stability or equilibrium: "The synthesis of the bond [i.e. habit] cannot be explained by the intention or the effort to *dominate* an excitation, even if it has this effect". (Deleuze, 1968, p. 156, my translation). In other words, cooperation is a product among others. And even as a product, it is one that encourages a move away from what it was. In this sense, not all habits are acquired with predictive, regulatory, or optimising intent. Instead, a significant number of habits arise from the unintentional reinforcement of arbitrary connections that are not included in any attunement aim (with Cappuccio & Ilundáin-Agurruza, 2021). Thus, when we speak of reified patterns in our habitual behaviour, or assemblages into which our habits enter, *cranky alignments* and a multi-track historicity have to be taken into account (Slaby et al., 2019, p. 8).

Said that, from this ontology of habit as an event it follows two main characteristics: habit as flexible and habit as supporting a particular life-mind continuity thesis. The first characteristic follows easily but is a hallmark for situating Deleuze in post-cognitivism debates. The second one reveals discrepancies towards other similar post-cognitivist positions.

#### Flexibility of Habit

Habits are defined by being circuits of intensities that flow through slightly different patterns given that are executed in slightly different contexts, and hence, performing slightly different actions. The intensive networks arise by deviating more or less from the previous trajectory of the intensive flow in order to account for the new elements of the context. This deviation is the basis of habit. And it is worth remembering that the context also may change due to the changes that the action of habit itself generates.

But, as following Deleuze's ontology the genesis of habits consists of a flow of intensities that enters into an operational closed circuit of affordances and singularities, therefore, *habits are territorialised contexts; habits are fundamentally constituted by the environment*. Habits are nothing but changes in the patterns of affordances and singularities of a milieu, a part of which acquires operational closure.

In this sense, to speak of habits as having either a high sensitivity to context or a strong rigidity is a fallacy for Deleuze: habits are *constitutively* flexible. In some sense, habits are constitutively *territorialised contexts*. So, Deleuze does not have to face the problem of explaining the context-sensitivity of habit. In short, it follows from Deleuze's proposal of habit as an event and not as teleology that Deleuze justifies habits as flexible. Flexibility is much more a fundamental characteristic of habit than could be mechanicity, automaticity or routine.

## Life-Mind Continuity, but *Different*

For Deleuze the characteristics of human habit apply to the whole "cosmic" organisation. In the end, if habit is an event, it could happen in very different stages of organisation. Deleuze anticipates the life-and-mind continuity thesis of some enactivists (Varela, 1979; Ramstead et al., 2020; Kiverstein, et al., 2022; Di Paolo, 2023):

"It is necessary to attribute a soul to the heart, to the muscles, to the nerves, to the cells, but a contemplative soul whose role is limited to contracting the habit. There is no barbaric or mystical hypothesis in this: on the contrary, habit manifests in it its full generality, which does not concern only the sensory-motor habits we have, but, first of all, the primary habits that we are, the thousands of passive syntheses that compose us organically" (Deleuze, 1969, p. 124-125).<sup>83</sup>

However, while Deleuze could agree with enactivism regarding the mind-life continuum, he nevertheless disagrees on how to understand the basis of self-organisation that lies behind the continuity thesis. For enactivists such as Varela (1991), Di Paolo, (2017, 2022), Rietveld (2008, 2018), Kiverstein et al. (2019), Friston (2010) or Allen & Friston (2018) among others, valuation is a fundamental mechanism that underlies the self-organisation of the system. They understand pleasure and displeasure as the mechanism that through informing about how attractive or repulsive it is to approach a state or singularity constitutes the first minimal forms of agency.

But Deleuze conceives it the other way around: *pleasure derives from habit* (Deleuze, 1968, p. 155). Pleasure arises once there is already an operational closure of intensities. Pleasure is not a principle that causes the binding to occur.<sup>84</sup> Nor are the mechanisms of valuation and agency co-constitutive. Previous to any motivational self is self-constitution, is the event that is the habit, the binding. In precise terms, first there are the intensities that flow according to their differential relations and get caught in a certain network of critical points: there is no valuation or pleasure here.<sup>85</sup>

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<sup>83</sup> This is in line with recent research by the biophysicist and microbiologist, M. Levin. In his work, Levin helps to further de-centre the cognitivist approach. Criticising neurocentrism, Levin claims the role of the collective intelligence of non-neuronal cells (Levin, 2014; Levin & Martyniuk, 2014, 2018; Ciaunica & Levin, 2022). Deleuze has much to offer Levin in terms of organisation in assemblages and embryological development through organic development paralleling an unfolding in the field of singular points. Underpinning both thinkers is the idea that "the system is populated by subjects, at once larval subjects and passive selves [moi]. They are passive selves [...] because they are the support or the patient of dynamisms". (Deleuze, 1968, p.185).

<sup>84</sup> "What in general makes possible not pleasure itself but the value of principle taken by pleasure, is the link or the investiture of difference: one thus passes from a state of dispersed resolution to a status of integration [...] the beginning of an organisation" (Deleuze, 1968, p.155, my translation).

<sup>85</sup> "Singularities are turning points and points of inflection; bottlenecks, knots, foyers, and centers; points of fusion, condensation and boiling; points of tears and joy, sickness and health, hope and anxiety, "sensitive points"... [Yet, a singularity] is essentially pre-individual, non-personal, and a-conceptual. . [Yet, a singularity] is essentially pre-individual, non-personal,



Deleuze thus completely turns to its head the enactivist principle according to which the sense of agency is self-organisation. Deleuze never tires of reminding us that self-organisation emerges out of the flows of intensity through singularities (Deleuze, 1968, 1980, 1988). Self-organisation is an event traversed by synchronisations, bifurcations and interferences between different levels of organisation. For Deleuze, who departs from a non-anthropocentric Habitus, there is an organised pattern before there is any valuation. There is no *telos* towards self-organisation or self-distinction, but it comes out of a chaotic and random result in which there are as many gestures of grouping and attunement as there are gestures of distancing, differentiation and specialisation.<sup>86</sup>

For not seeing habit as an event and for insisting on seeing in self-organisation the design of life preservation, it happens that enactivism is still arguing about the dilemma of which principle comes first: preservation, pleasure, or both at the same time (Hutto & Myin, 2013; Kiverstein, 2022; Di Paolo, 2018). However, this problem *is dissolved if they forget to take the principle of self-organisation as orientation and focus on the principle of self-differentiation*. The issue is not the preservation of life but the propagation of the growth of diversity both internally (creation of different organisations and internal complexities) and externally (the basis of self-organisation is differentiation from other agents of the same scale).<sup>87</sup>

In conclusion, all this shows that the principle of attunement here goes hand in hand with the fundamental idea of an agent prior to an "I" that is not only

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and a-conceptual. It is quite indifferent to the individual and the collective, the personal and the impersonal, the particular and the general-and to their oppositions. Singularity is neutral" (Deleuze, 1969, p. 52).

<sup>86</sup>This follows a deeper philosophical argument that can be understood thanks to Deleuze's temporal ontology. "The problem of habit is ill-posed as long as habit is subordinated to pleasure. Either it is considered that repetition in habit is explained by the desire to reproduce a pleasure obtained; or that it can concern unpleasant tensions in themselves, but in order to master them, in the aim of a pleasure to be obtained. It is obvious that these two hypotheses already presuppose the principle of pleasure: *the idea* of pleasure obtained, the *idea* of pleasure obtainable, act only under the principle, and form from it their two applications, past and future". [...] But habit, as a passive synthesis of bond, precedes, on the contrary, the principle of pleasure and makes it possible. And the idea of pleasure derives from it, just as the past and the future come from the synthesis of the living present" (p. 156, my translation). That is, Deleuze's proposal highlights the paradox that enactivism encounters. At a first level, enactivism presupposes *the idea* before the organisation of the habit. This, let us say, is already a known debate in enactivism. Deleuze, however, makes an even deeper critique of enactivism, for he shows that only when there is already a habit that grounds the perception of past and future time, can a pleasure emerge as a memory of a pleasure or as a project to be obtained. To presuppose a pleasure, even if this is a mechanism evolutionarily built into the agents, is not only to put "ideas" into the agents, but to put a sense of pleasure or valuation before those same agents have a notion of past or future, which seems somewhat implausible, as past and future only appear with habit according to Deleuze. In short, habit precedes pleasure.

<sup>87</sup>Di Paolo already uses the concept of "self-individuation", sometimes "self-distinction" as one of the key elements to define the agency of an operational closure. Although Di Paolo is accompanied by a cosmion to which the discrepancies here exposed on the mechanism of evaluation (very close to the other requirement of agency: internal normativity) can be applied, it is a concept from which I believe that a very interesting research can be developed, very close to the Deleuzian proposal. For more see Di Paolo et al., (2017) and Di Paolo (2023).

reflective or rational, but also evaluative. *Post-cognitivism, in both its more computational and phenomenological versions, has as its starting point the already constituted human being, which does not allow us to see the marginal and self-differentiating factors that affect and are produced by cognition.*

### **Some Conclusions**

To sum up, Deleuze considers *habit as an event*, as a knot, but it is not something intentional: "we are water, earth, light and air contracted, not only before we recognise or represent them, but before we feel them. Every organism is, in its receptive and perceptive elements, but also in its viscera, a sum of contractions, of retentions and waitings". (1968, p. 123). Everything we observe *as organised* is, in effect, habit. *This does not detract from the fact that there are things that are not organised.*

Deleuze tries not to presuppose the agent. Instead, he treats it as a consequence. Accordingly, he exposes how habits are generated and how they expand, differentiate and affect and are affected by other habits. As it does not start from a subject, it is not forced to add variables or complex mechanisms in order to maintain a balanced system around a subject as a central axis. Following this, he will defend the importance of 1) non-equilibrium-directed cognitive events, 2) a whole normativity that vindicates diversity and diversifying processes, 3) placing itself frontally against the consequences of a habit philosophically and scientifically understood as a mechanical residue.

Far from Deleuze's position being an irrationalist stance far removed from the cognitive sciences in general or from the framework of the post-cognitivist paradigm in particular, it is even more faithful to the ideas of the predecessors of post-cognitivist. Dewey himself warned in a chapter devoted to the role of impulses in behaviour: "the fallacy consists in transforming the (truistic) fact of acting *as a self* into the fiction of acting always *for self*" (Dewey, 1922, p. 136); a fallacy that as seen, could be applied to some current post-cognitivist.

#### **4.1.3 Habits from Deleuze's point of view.**

Deleuze offers post-cognitivism an alternative ontology of habit. His is a habit based on a philosophy of difference which does not fall into the normativity proper of the "dialectic of identity" but which, as we have seen, offers very similar empirical models. So far I present ontological and physical explanations of what habit is for Deleuze. Now, I turn to how these relate to regular practices and tendencies on the scale of human action.

#### **The "Double Law of Habit"**

For me, the best way to bring Deleuze's *Habitus* into human's habits is by reinterpreting the notion of habit held by F. Ravaisson (an absent philosopher from the debates on the mind but who is much vindicated by Deleuze). In his

famous book "The Habit" (1838), Ravaissou expounds *the double law of habit*. The double law stipulates, on the one hand, that the more repetitions there are of an impression, the *less* intense it becomes. This can be equated to the phenomenon of sensory habituation, which is easily proved, for example, with smell or sound. But this is in the realm of impression. On the other hand, in the realm of activity it is the other way round. The more repetitions the *greater* the intensity. As constant practice of an activity allows for higher levels of performance and excellence, which is proven with any technical or physical skill.

Deleuze agrees with Ravaissou in pointing out that habits obey a double law. But for Deleuze, it is better expressed by the fact that habits affect in two directions, one external and the other internal to the agent. That is to say, all habits have a performative character. The external consequences refer to the fact that other agents are affected by one's habits. For example, as the *cognitive niche theory* has pointed out, an agent's repeated action modifies and structures the material and cultural environment at its disposal (Hutchins, 1995; Laland, 2016; Malafouris, 2019; Sterelny, 2018). Moreover, my action also directly affects other cognitive agents, who interpret and are affected by my action without the need to enter into reflexive dynamics by unconsciously engaging, repelling or responding to my activity (Di Paolo, Cuffari & De Jaegher, 2018; Gallagher & Allen, 2018; Zawidzki, 2018)<sup>88</sup>. On the other hand, habit has an internal affect, namely, it implicates a change in the set of interoceptive, affective, perceptual, morphological and motor patterns as clearly exposed by what I will later call "the spiral of habit". In what follows, I will develop some consequences that follow from this double law of habit according to Deleuze.

### **Creativity without Dualisms**

Deleuze further stretches Ravaissou's distinction. Deleuze stresses that there is no such distinction between the two sides of the law of habit, between the law of impression and the law of activity, but that *the two facets of habit are but one and the same thing*.

According to the intensification of action, each time an action is repeated, new possibilities and variations open up, generating possible new concrete and flexible habits. *In its execution, habits lead us to encounter new details, new affordances that were previously invisible. This is the inextricable intertwining of sensory habituation and active specialisation.*

In ontological terms, this equals to say that habits intensify and deepens its field of affordances by discovering new possibilities of action. Most importantly, their own action inevitably intervenes by modifying the outside, thus changing the context, further contributing to the possibility that new critical points (that is, new attractors, singularities and affordances) may participate in the habit. That

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<sup>88</sup> "All this forms a rich field of signs, each time enveloping the heterogeneous and animating behaviour. For each contraction, each passive synthesis [i.e., each habit] is constitutive of a sign" (Deleuze, 1968, p.123).

is the habit of changing habits. All in all, "Deleuze's double law of habit" dictates that far from the mechanistic, consolidating and equilibrium-reaching effects of habit, *habits are the paradoxical activity par excellence that, while making the world more habitable and available, promotes its complexification and diversification.*

To say it directly, the mechanical or Watsonian habit can be understood precisely as the exaltation of just one side of the law of habit, that of the law of impression. *The mechanised conception is only the exaltation of the phenomenon of sensory habituation understood exclusively in terms of impression but erroneously applied also to action.* Consequently, this conception extends the idea of habituation to the expressiveness of action, which leads to ignoring the changes produced by the action of habit and instead treating habit as a petrifying mechanism.

In Deleuzian terms, the Watsonian conception is based on the vices of the dialectic of identity, ignoring all the performative and diversifying effects of habit. In practical terms, the Watsonian conception may come from extrapolating a mechanism of habituation that can only be considered by isolating it from its active counterpart when examined under conditions of extreme contextual constraint (as in fact happened historically with animal experiments or currently with artificial models with restricted context-sensitivity, see §2.2). This is why we can conclude that no matter how many other post-cognitivist elements a perspective may include, but if it explicitly or implicitly holds such a conception of habit, that is, if it holds the habit-goal duality that has been described throughout this thesis (§2-§3), then this perspective still participates in a more fundamental dualist and cognitivist conception that fundamentally distinguishes between impression and activity.

From a more sociological perspective, the fact that the habit-goal dualism is still implicit in the conception of human cognition is particularly alarming, especially because it legitimises the conception underlying the design of artificial cognitive systems aimed at "improving our lives" based on the generation of outputs from predictive models. As I said in a previous note, the generation of content by AIs is offered to the world along with the idea that these systems take away "mechanical" and "routinised" work so that we can devote ourselves to "creativity".

This conception is, without a doubt, to think that work and creativity are separate. In short, it is to think, as was believed in modernity, that "ideas", intentions and objectives are one thing, and routine actions are another. That is to say, that although philosophy insists that agency starts from a sensory-motor loop, although it insists on situating and corporealising the mind, although it recognises the importance of the body, the mind-body dualism cannot be overcome if we do not overcome the habit-goal dualism.

And I have tried to point out in this thesis that there are problems that also arise when we try to overcome this by incorporating these goals into the organism in

the form of equilibrium, resistance to entropy or survival. *All in all, the error of conceiving that agents have goals is resorted to because it is necessary an element that compensates for the error of supposing the rigidity of habit in order to be able to understand the processes behind "creativity" and "exploration"*.

By contributing to the idea that creativity goes separately, we overlook that, as Dewey himself said, "habit is the basis of artistic life. Without the acquired habit, the sensitive and emotional capacity for the perception of colour, line and form, for melody and rhythm, texture and tonal expression, would not exist. Art education is education in habit" (1934, p. 57, my translation). In this sense, Deleuze's habit is particularly close to that idea of Dewey and is completely at odds with the habit-goal dualism in a far more clear way than other post-cognitivist.

In short, Deleuze claims that one is good at what she does, and becomes creative, because her "genius" or peculiarity is in each of her strokes, her phrases or her way of doing or thinking. She is not a "genius" because she envisions her goal, because of her "eureka", because she envisions her final result directly. The latter can certainly motivate her, but the (always unexpected) result is revealed by her way of doing. Eliminating the routine part to leave us with only our ideas and creativity, as the new developments argue, is, if not a utopia that leaves a bare foundation for creativity, then overpopulating a world with poor ideas.<sup>89, 90</sup>

### **The Spiral of Habit**

Deleuze is pointing to the intelligence and cognitive capacity that resides in habits. He is pointing to the cognitive priority of habits over other faculties that are but unfoldings of them. Habit is not the subsequent optimised version of other conscious goal-oriented processes (as claimed, p.e., by Maisto et al., 2019). Consequently, deliberate, imaginative or hypothesis-generating processes should also not be seen as an adjustment mechanism only, but because they are not separate from habit, they continue the process of differentiation promoted by the "double law" of habit.

These more specialised cognitive processes enhance the expansion of affordances and singularities. Specifically, high-cognitive processes illuminate more complex affordances, often mixed with symbolic components. For example, memory, imagination or even mathematical reasoning are supported by neural, corporal, material and symbolic structures. In the same way, these processes enable us to reread the opportunities of the environment according to them, therefore, contributing to acknowledge more detailed and precise affordances as the action

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<sup>89</sup> "Repetition is in no sense the essence of habit [...] The essence of habit is an acquired predisposition to ways or modes of response [...] Habit means special sensitiveness or accessibility to certain classes of stimuli, standing predilections and aversions, rather than bare recurrence of specific acts" (Dewey, 1922, p. 42).

<sup>90</sup> According to Deleuze, the painter creates with what he calls "the blind hand" (1980, 1981). That means that the body can create by producing apparently heterogeneous connections that are permitted by the world but that are impossible for reason to see.

intensifies. In this sense, as Rietveld et al. (2018) see it, it seems possible to realise a theory of affordances that accounts for complexity and cognitive richness beyond basic minds. In short, both Deleuze and Rietveld et al. (2018), understand that a certain arrangement of a set of affordances for a combination of, p.e., imaginative, linguistic and memory cognitive process allows us to be in a particular state like, for example, sitting in a chair, being in a particular metabolic state, or being able to use symbolic elements that allow me to be writing this thesis right now.

However, Rietveld et al. (2018) conceives that the movement in these affordances arises from an evolutionary *hyperprior* according to which the individual has to be in a metastable pattern. In this process, the individual finds herself in situations in which she must assess whether to rely on the pattern of affordances she has or to go in search of another pattern that provides epistemic value as a means to the end of survival (Badcock et al, 2019; Friston, 2019; Rietveld et al; 2018). But Deleuze sees the matter quite differently. While Deleuze's ontology shares (anticipates) the structural conception of affordances, it does not follow that the engine of change and movement is in the agent's inherent motivation to achieve adjustment. Instead, it is about acknowledging the disturbances and differentiations produced by the internal and external chaotic processes that occur because of habit performance.

Let me explain this better in terms of Deleuze ontology. If we recall §4.11, the affordances are meaningless if not related to another affordance: neither  $dx$  nor  $dy$  have value in itself, only " $dy/dx$ " has it. That is, the basis of experience are differential relations, the basis of flow of intensities, of movement, are differential relations: "Every phenomenon refers to an inequality that conditions it. All diversity, all change refers to a difference which is its sufficient reason. Everything that happens and appears is correlative of orders of differences, difference of level, of temperature, of pressure, of tension, of potential, *difference of intensity*. Carnot's principle says it in one way; Curie's principle, in another". (Deleuze, 1968, p. 333, my translation).

This is the motor of the world, and Carnot and Curie say so in a way. But Deleuze does not understand this difference as a difference that needs to be reduced, not even when reading such pioneer voices in the field of thermodynamics. So, translated into terms of affordances, Deleuze does not deduce from his ontology that there is a need to find a closed series of affordances ( $dy/dx/dw.../dz$ ) incapable of unbalancing. On the contrary, as Deleuze would say, the balanced series or pattern can and does happen, but it is evoked not to be repeated in the same way. *The pattern itself will make it possible for this series to disturb the outside and the inside, which makes it an endless circle: the engine gets complex.*

We find, then, that habit is the mechanism of varying or adding " $dy$ "s, that is, it is the mechanism of flexibility, emerging from the context. But it is also the

mechanism of depth and specialisation. As Deleuze's double law of habit illustrates, impression and action go together: *my impression is displaced, modified or even desensitised, at the same time as my action intensifies and focuses on sharper terrain. The effect of both together is that the threshold of intensities is shifted and I discover new affordances that were not there before.* I enter into dialogue with new affordances and singularities and in this sea new habits are formed.

Let us say that by definition a static series, a mechanical pattern, *a complete operational closure is impossible.* Even when the case of "bad habits" happens, what is happening is not a petrification or a vicious circle, but rather a spiral in which environment, thoughts, affections or interceptions, vary in intensity towards a perfectly self-destructive or isolating dynamic. The double-edged dynamics of insensitivity of impression and specialisation of action are present in these vicious spirals. Although from the outside it looks like an unproductive pattern, it is nevertheless a dynamic that deepens and specialises.

Yet these are the extreme cases, which highlight the impossibility of mechanicity. Far from all this, what follows from Deleuze is that it is precisely the mechanism of habit that opens up new motor, perceptual and imaginative possibilities. In this sense, the mechanisms of habit are not an optimised or petrified residue of the mind but precisely its stimulus, its motor and its fuel. Habits are not subordinate to high-level cognitive tasks. Instead, they facilitate these tasks by revealing possibilities through flexible and sharper sets of affordances.

After all, the drift of pseudo-repetitions goes hand in hand with the increase in the diversity and richness of the set of affordances. As has been said, not only is this to be understood in terms of basic minds, but especially this richness is expressed in the different ways through which complex agents deal with affordances in particular and idiosyncratic ways, specially because higher-cognitive tasks are involved in the movement of the structure of affordances.

### **Micro-Perceptions**

Finally, Deleuze's ontology of habit follows a vindication of the cognitive role of micro-perceptions. If, on the one hand, the spiral movement of habit goes hand in hand with the proliferation of forms of life, micro-perceptions are another example of cognitive complexity and richness.

As I have been pointing out, habits are composed of a substratum of intensities, a field of pre-individual singularities and energies which differential relations produce the flow of intensities. But not all of that flow reifies into a stable pattern. Singularities and intensities coexist beneath the patterns like a bubbling sea. The movement singularities are precisely what often pull the patterns in new directions, but many of them are not integrated or tied together.

Take for example some neurodynamic processes where we also find dynamical systems theory. These methods are mainly used for approaching the generation of wave patterns out of a chaotic background (Kelso, 1995; 2012)<sup>91</sup>. But here too, it is possible to put oneself in the perspective of the philosophy of difference in order to make sense of these mechanisms.

One of these neurological mechanisms is "binding-by-synchrony" (Engel et al., 1997). This mechanism suggests that the synchronous firing of a group of neurons in an area, which forms a particular firing structure, can result in the perception of a specific object or concept. For example, if we see a familiar object, such as a dog, a specific group of neurons spread across an area of the brain is synchronously activated as a representation of that object. Just like the habit affordance-pattern, slight changes in the dog's environment will change the neural structure representing that dog.

Another example is evidence-by-integration (Mazurek et al., 2003), commonly treated as the brain's way of making decisions about what happened. The neurological mechanism of evidence by integration suggests that above a certain threshold of neural activation (a singularity), a stimulus is given credence. This mechanism is basic even to the predictive coding or predictive engagement approach (Hohwy, 2013), paradigmatically exemplified by the binocular rivalry experiment. Here, each eye observes one object but we perceive the alternation of one and the other, not both at the same time. This is supposed to happen because there is not enough evidence to predict which image is better to focus on.

But what is relevant of these mechanisms in a Deleuzian reading is that both mechanisms refer to the existence of intensities that become integrated under a territorialised structure.<sup>92</sup> These two cognitive mechanisms are in line with Deleuze's ontology. However, first of all, from Deleuze's theory we should not focus on the structured pattern but on the general picture that includes all the chaotic background activation. In this sense, the way Deleuze understands these phenomena is closely related to his notion of event. So, there are no internal representations (structured patterns) that mimic an external structure. Rather, from Deleuze's theory, we can see that what gives rise to a certain concrete experience is the continuity between a certain internal structure that complements a certain external structure. When such patterns complement each other, when some intensities flow through a circuit of affordances that include internal and external affordances, we see an event appearing out of chaos.

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<sup>91</sup>"More radical departure from linearity is when one and the same cause can yield different effects, or different causes produce the same effect. Examples in neuroscience include the catalytic effect that some hormones have on the brain, the effect of any one substance depending on the brain area involved" (DeLanda, 2021, p. 32).

<sup>92</sup> "A conscious perception would never be produced if it did not integrate an infinite set of small perceptions that unbalance the preceding macro-perception and prepare the next. How could a pain follow a pleasure if a thousand small pains or rather semi-pains, which are going to gather in the conscious pain, were not already dispersed in the pleasure?" (Deleuze, 1988, p. 113, my translation).



Secondly, and perhaps more importantly, both neurological mechanisms focus on the emergence of conscious intentionality. That is, in phenomenological terms, binding-by-synchrony and evidence-by-integration establish the division between subject and object where there is actually a sea of intensities. In this regard, Petitmengin (2017), who works from the field of neurophenomenology, develops evidence that prior to this state where the idea or recognition of an object appears, there are micro-perceptions "micro-ideas" that, prior to having a narrative, do not distinguish so clearly between subject and object (Petitmengin, 2017, p. 144). This is a research that also acknowledges to focus on chaotic activation and not just on its collapse.<sup>93</sup>

What Deleuze warns is that the cognitive potential lies not so much in the latter as in the former. Micro-perceptions contain information, be this information coherent or useful, or not. A structured subset of them may lead us to the most optimal information, which is of course useful, but this is the peak of an iceberg of cognition. It is not but this "molecular" scale of perceptions where the real movement between intensities ( $dy/dx$ ) resides. Micro-perceptions are "stings of restlessness that cause the instability of all perception." (Deleuze, 1988, p. 113, my translation). Micro-perceptions lead to cognitive movement and are the basis of a big part of our daily moments that get ignored as "unuseful", cranky or freak.

Deleuze's schema opens the way to observe the existence of a marginal cognition. That means not only that the perceptions that gain access to consciousness are the product of the many other tensions that occur perceptually in an unconscious terrain. But moreover, Deleuze's proposal suggests that certain structured and coherent perceptions do not aim at practical utility or optimal benefit for the organism as a whole. Conscious perceptions do not need to arise where the subject takes part for the purpose of adjustment to the environment, survival or thermodynamic reduction. Conscious perceptions arise insofar as the subject's singularities operationally complete or continue part of an external pattern of singularities.

Even more, when we talk about these structures of affordances (territorialised or deterritorialised) we have to keep in mind that they can refer to different scales. That is to say, the structure that translates into (marginal) perception can range from totally unconscious micro-perceptions to "non-useful" thoughts, ideas, hypotheses, constructs or even actions or plans. Remarkably for Deleuze, somewhere in an intermediate range, there may be isolated cranky experiential

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<sup>93</sup> "That small perceptions are in themselves distinct and obscure (not clear): distinct because differential relations and singularities are grasped, obscure because they are not yet "distinguished", because they have not yet been differentiated, and these singularities, condensing, determine a threshold of consciousness in relation to our body, as a threshold of differentiation, from which small perceptions are actualised." (Deleuze, 1968, pp. 321-322, my translation)

phenomena and more creative forms of thought that we experience and affect us but we are not necessarily able to offer them a coherent narrative or meaning.

To sum up, from the dynamics of Deleuze's intensive physics, we come to deal with questions of microperceptions or marginal cognition. More neuroscientific and neuropsychological development is needed on these issues. The foundations of neurophenomenology (Varela, 1996) can help us to acknowledge and describe these phenomena in order to give them their proper relevance in daily life.

## 4.2 Deleuze's Habitus in Post-Cognitivism

### **4.2.1 Deleuze and Four Post-Cognitivist Philosophers of Habit**

#### **M. Merleau-Ponty**

Deleuze advocates for the fundamentality of habit in ontological and epistemological terms. As I have mentioned on other occasions, in the 4E programme we already find similar ideas, on many occasions, taking up the ideas of the philosophers Heidegger, James or M. Merleau-Ponty (Di Paolo, 2003; Noë, 2009; Heras-Escribano, 2019; Sutton et al., 2011; Kaufer & Chemero, 2016; Testa & Caruana, 2021; Miyahara & Ransom, 2021; are some of the many examples). For this whole perspective, I believe that Deleuze's philosophy can serve as an enormous support for their arguments, even if it entails some different nuances.

Particularly, these nuances can be seen in contrast to the philosophy of Merleau-Ponty. As many may have noticed, I have not referred much to this author throughout the thesis. This is because on many occasions he has been cited for basing his embodied philosophy on the premise of agents' search for equilibrium (Di Paolo, 2019; Dreyfus, 2007; Kirchhoff, 2015; Kiverstein & Rietveld, 2015). Worth saying is that, indeed, Merleau-Ponty's contributions have been invaluable for understanding the structural union of mind and world, perception and motricity and for having explicitly suggested that habits shows at least some flexibility rather than an instinctive stimulus-response relation (Merleau-Ponty, 1938). However, at base, this structural dynamic propels given that "disequilibrium or absence inspires or motivates self-organised compensatory activity or 'auto-regulatory fluctuation'" (Merleau-Ponty 1968, p. 149; in Kiverstein & Rietveld, 2015, p.710).

Contrarily, Deleuze's idea is that life and thought (i.e. agency) do not create solutions but problems. Structures propitiate new differentiations which in turn are nothing but constant reconfigurations of affordances, new *problematic fields* (Deleuze, 1968, p. 252). And, as has been said, habit is the event *par excellence* whose mechanism implies that what has been grouped together is progressively taken to a deeper level. Indeed, if we abstract from the teleology that appears in Merleau-Ponty, we can say that his structuralism and his phenomenology have

sometimes hit the key: "our existence as a whole has "a problem," an absence, which is "not a lack of this or that"" (Merleau-Ponty, 1968, p. 155-6).

Maybe, what should be emphasised from Merleau-Ponty is that he observes that, as complex biological systems, living organisms are always simultaneously "in a state of relative equilibrium and in a state of disequilibrium" (p. 149). Or as Deleuze puts it: in a process of reterritorialisation and deterritorialisation, which are not just two moments that follow one another (i.e. contraction and dilation), but also two directions that happen simultaneously in every action. It is from here that we can come to see the richness and proliferation of diversity that habit generates by including new affordances. "Habit expresses our power of dilating our being-in-the-world, or changing our existence by appropriating fresh instruments" (Merleau-Ponty, 1945, p. 166).

## **H. Dreyfus**

Thus, my proposal is to include the view from and towards diversity as complementary to the philosophical contributions that defend the cognitive relevance of the habit. In this defence, one of the most relevant contemporary thinkers is surely H. Dreyfus, who was among the firsts who worked hardest to open the way to the 4E, by bringing the phenomenology of Heidegger, Husserl and Merleau-Ponty to pragmatist and philosophy of mind terrain in order to insist on the primacy of embodied cognition over any representation. Notably, Dreyfus worked on the idea of habits or "*l'habitude*" as not merely a routine, but expressing its ability to flexibly switch attention between global aspects of performance and the execution of specific motor control (1998, 2002).

However, almost as a parallel critique to Deleuze's critique of Merleau-Ponty, Varela (1996) addressed a crucial one to Dreyfus. The main point is that Dreyfus claimed not only the priority of bodily habitual intelligence, but that this provides a kind of privileged knowledge. Thus, according to Dreyfus, habitual knowledge, after severe practice, led to an expertise in skill, a "mastery", endowed with the greatest flexible, creative and skilful capacity (Dreyfus, 1992). This was so because, he claims, it is the form of agency most closely coupled and balanced with what was happening through the external world (Dreyfus, 1992; 2013, p. 35; see Dreyfus, 2014). Against this, Varela clearly expressed: "Would be a mistake if one believes that one exposes a "deeper layer" by acquiring some skill such as stable reduction or engaging in a practice such as mindfulness/awareness [...] there is no privileged vantage point to tell us what counts as "real" experience. He [Dreyfus] has plainly misunderstood the main point: phenomenological reduction [or *à la* Deleuze, the look at the intensive field behind habit] does not "uncover" some objective ground, but it does bring forth new phenomena within the experiential realm, in an unfolding of multiple possibilities" (Varela, 1996, p. 346).

## E. Di Paolo

Leaving aside Dreyfus' epistemology of attunement and fit, which we now observe as having some vices of a philosophy of identity, his contributions worked steadily towards a habit-based epistemology endowed with a rich, non-mechanistic habit that was explicitly directed against the computationalist project (Dreyfus, 1992). Noë (2009, p. 98) also once expressed this idea. But perhaps it is E. Di Paolo, our second philosopher of habit, who in a very similar vein to Dreyfus and Merleau-Ponty, already expressed in his first texts the basic line of a project that would gradually gain complexity: "We may invest our robots not with life, but with the mechanisms for acquiring a way of life, that is, with habits. This may be enough for them to generate a natural intentionality, [...] [based] on *the conservation of 'one' way of life*". (Di Paolo, 2003, p. 31, my emphasis).

Di Paolo's work has been crucial in vindicating habits. As I noted previously, his proposal is almost entirely Deleuzian. According to him systems "are always processes, organised patterns of change, intensities, rhythms, and relations." (Di Paolo, 2019, p. 206). Habits are networks, "sensorimotor clusters" of dynamics that link agent and world. The total sensorimotor agency would be a large set of these operational clusters that traverse affordances: therefore, agency would be a cluster of clusters, a habit of habits (Di Paolo, 2019). Ultimately, all this schema is based on the fact that these clusters are "precarious" and thus in need of action and movement (Di Paolo, 2019, p. 204; Di Paolo, 2017, 2021, 2022).

Furthermore, Di Paolo e, in line with Simondon's vision, emphasised that agency could be defined by three characteristics, one of which is *self-individualisation*, self-distinction from the medium, as a cluster that distances itself and "strives" to differentiate itself from the rest (as a spiral of habit) (Di Paolo et al., 2017; Di Paolo, 2023). Something I see totally in line with our proposal. The other two characteristics are *asymmetry* and *normativity*. Asymmetry reflexes the necessary agent-environment relationship, and can be read in a fully Deleuzian key, as it is what allows for the flow of intensities, hence for movement (dx/dy). The most problematic may be normativity. It refers to the organic evaluation exercised by the agent. This characteristic is very close to the thesis of the mind-life continuity and for which I have already discussed above that Deleuze would give priority to the formation of a habit rather than to the mechanism of evaluation. Moreover, at its extreme, normativity is inciting a blind teleological theory of adjustment and the pursuit of equilibrium.

Be that as it may, Di Paolo is probably the one who exemplifies the best part of the image that Deleuze has of habits. If this were not enough, as Deleuze suggests, Di Paolo points that among these habits there are "several kinds of relations of support, priming, inhibition, and so on" (Di Paolo, 2019, p. 216). Furthermore, Di Paolo, has worked in the concept of "participatory sense-making", which focuses on the fact that habits or patterns help to connect

agents in such a way that they jointly disclose new senses (Di Paolo & De Jaegher, 2012; Di Paolo, 2021); although, worth to say, Deleuze applied this beyond the human-human union.

But surprisingly, although Di Paolo knows that Deleuze talked about habit (Barandarian & Di Paolo, 2014), he never made explicit their similarities. It is recent that he does mention authors such as Piaget and Simondon, who influenced both authors (Di Paolo, 2019, 2021). Relying on Simondon, Di Paolo seems to get even closer to Deleuze and get far from attunement: "each sophisticated mode of *individuation consists in finding ways to avoid the more determined stages of more basic individuation processes, by entering into determinations that postpone other determinations, keeping potential options open for longer periods and creating new possibilities*" (Di Paolo, 2021, p. 795, my emphasis). So it seems that the objective of attunement, present but more distant, is seen less and less as the generative process: generation arises in transit or impasse, i.e. in deterritorialisation.

Accordingly, it seems that is gaining momentum the study of the possibilities that can emerge precisely not as forms of task-relevant engagements, attunement or with the aim of gaining epistemic value for lately prepare a better grip (Di Paolo, 2017; Badcock et al., 2019; Kiverstein et al., 2022). *Post-cognitivism seems to be closer than ever to the idea that it is in the transitions, in the postponement of equilibrium, that new generative events take place.* It is understood that these events can take the form of new precarious self-organisations which, at the same time, have the effect of continuing the process of differentiation through new postponements.

Following this, even more recently, an ultimate point of similarities between Deleuze and Di Paolo is that Di Paolo has opposed equating FEP to enactivism due to the unavoidable historicity of autopoietic systems. Specifically, Di Paolo gives as "embryogenesis, life-cycle patterns, epigenetic variability, metamorphosis, and symbiosis" (Di Paolo et al., 2022, p. 21) examples of processes dependent on historical transformations that cannot be developed according to FEP's logic. The idea behind the distinction between FEP and enactivist, put it very roughly, is that FEP insists that systems need to pass through a particular set of attractors to constitute a particular organisation, whereas some enactive process unfold through a historical change of the set (Di Paolo, 2022, p. 17). There is nothing such a zero time or default set for some enactive processes. (Di Paolo, 2022, p. 17). This is something totally in line with the Deleuzian proposal, which particularly addresses embryogenesis. For Deleuze, intensive patterns apply at all scales, not only in the sensory-motor ones. Embryogenesis is also a process according to which an unfolding field of intensities forms increasingly complex structures in what is a living being.<sup>94</sup>

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<sup>94</sup>Deleuze was particularly interested in von Baer's theory, which considered embryonic development to follow a process of progressive differentiation, with each stage being the result of the previous one and the starting point for the next. According to Deleuze, this theory made it

So, Di Paolo himself delves into entirely Deleuzian conceptions, but without any explicit mention of the French philosopher. However, there is big difference between them, because at base Di Paolo exaltates the power of the general over singularities: "Microevents are facilitated, enabled or impeded by larger configurations in the sensorimotor repertoire where not only a particular history has sedimented, but also possibilities, opportunities, intensities, and speeds of change are constrained by the whole" (Di Paolo, 2019, p. 218).

After all, Di Paolo's theory is the paradigmatic example of an epicyclic theory that tries to subsume singularities in a complex unified harmonical totality. Instead of acknowledging the generative and differentiating effect of habits, he tries to subsume them in other micro and macro dynamics until together they show an harmonical gear. In fact, at the base of his theory there remain remnants of a mechanical habit as it is illustrated in Di Paolo's distinction between horizontal and vertical relations. This clearly reflects the hierarchical vices inherent in the philosophy of identity:

"Sensorimotor schemes organise themselves into several kinds of relations of support, priming, inhibition, and so on. [...] Some of these links are functional as in the case of schemes that need to be enacted in some combination in parallel or in sequence (*horizontal* relations), some links are enabling, as in the case of schemes that influence the bodily or environmental conditions for other schemes to take place (*vertical* relations). [...] When these vertical relations form a closed network, we may speak of *habits*, that is, groups of schemes that become self-supporting as a consequence of regular enactments, and that in turns promote future enactments" (Di Paolo, 2019, p. 216).

The structural conception and the need to combine affordances in what is understood as a movement generated by the difference in intensities is indeed the proposal of Di Paolo and Deleuze. These two proposals can find many more points in common. In fact, from the enactivist proposal, it is even comprehensible the emphasis on balance, attunement and prediction. Studying order in the face of chaos allows us to have resources to understand the conditions that lead to aberrant behaviours, illness, conflict or even poverty or the poor utilisation of possibilities. In the end, identity is conceived as something provisional or precarious. On this point we agree.

But why does Di Paolo need such a strict division between horizontal and vertical dynamics? And why delegate the ability to select between one habit and

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possible to understand development not as a simple accumulation of parts, but as a process of continuous differentiation and creation. Development did not need a final *telos*, but the possibilities of development are understood as unfolding, as if they were in the same topological field as the differential field. Following G. Saint-Hilaire, it is as if there were one and the same species which is nevertheless folded in different ways. M. Levin's concepts are very similar with respect to the process of how cells understand their functions only when they are together. With Levin, the larger and larger ensembles unfold in different planes of action. (The concept of manifold is used here).

another to another flexible (and goal-oriented) mechanism? Why understand as petrified basic units the schemes as operationally closed? Why not think of the very lines of flight generated by the habit? Why the need for loops and metastable dynamics to endow the agent with vitality and movement? For Deleuze, complexity increases thanks to the immanent development of habits, without having to postulate, from outside, new dynamics that make the gearing a self-organised system.

### **C. Legg**

Leaving this aside, alongside these two authors, two more philosophers, C. Legg and I. von Maur, are offering valuable insights into habits in whose thought can be traced complementarities with Deleuze.

First and foremost, to Legg I owe the concept of "habit-based epistemology" (Legg, 2021; Legg & Reynolds, 2022). She has realised that the key to post-cognitivism is that agents (and "minds"!) are built from world-involving bodily habits (Legg, 2021, p.1). Thus, knowledge is not about information processing but about skilled performance at different levels (neurologically, physically, socially). All in all, it is needless to say more: post-cognitivism is a habit-based epistemology.

Perhaps the most curious thing is how Legg has arrived at this statement, since she has not dealt so much with a corporal or immersive aspect of the agent, but rather with its semiotics and linguistics. Notably, her philosophy has consisted of a rapprochement of Peirce's semiotics with post-cognitivism. It is this foundational pragmatism the same that Deleuze also claims. For, as Legg, *Peirce defined all belief as habit* (Legg & Reynolds, 2022, p. 7; Peirce: CP 6.435). So, Legg has analysed the use of signs as "habits of mind". With this, knowledge ceases to be representational and becomes part of a changing schema (stable but not fixed). The same laws that apply to "corporal" habits, apply as well to "mental" (and neurological) habits.

In other words, if signs are habits of mind, the meaning of signs derive from its use and the consequences of that use. (That is pure pragmatism; there is no need for any faculty of encoding or producing representations). Moreover, as with Deleuze, *signs must have an expressive capacity in order to function*. Signs must have an impact on something or someone: they must be interpreted (Peirce, CP: 5.594). "This process of continual reinterpretation of signs mirrors the growth of habits which is not surprising since for Peirce, all signs are habits" (Legg & Reynolds, 2022, p. 12). To which I add, growth of signs mirrors precisely the mechanism of expression-deepening of which Deleuze also speaks.

Peirce and Deleuze have much in common. According to Nöth (2016): "Peirce's theory of habit [...] examines how habits increase and how they diminish. The law of habit, as Peirce calls it, includes the habit of habit-change. Peirce speaks of the "habit of taking and laying aside habits" (2016, p. 40). The change of

habits is the same as the change of meaning of signs, it is due to the change of possible configurations in the world. As we saw in Deleuze's double law of habit, habit itself intensifies and deepens its field of affordances by discovering new possibilities of action, and on the other hand, its change inevitably intervenes in the exterior. So do signs. In our terms, there is no law of establishing habits, for habits are an event just like other flows of intensities. On the other hand, both Peirce and Deleuze believe that there is *a habit of changing habits*.<sup>95</sup>

## I. von Maur

Finally, I consider I. von Maur as the fourth one. At the core of her proposal is the concept of habit, which draws heavily from P. Bourdieu, but above all from S. Ahmed (von Maur, 2021, 2022). Of particular interest here is that the concept of habit appears tied to the concept of "orientation" (Ahmed, 2006). Orientation can be understood as the way of inhabiting space. Concretely, understood *à la* Deleuze and dynamical systems, orientation is the way we navigate through action patterns, it is the way we move by approaching or distancing ourselves from other affordances (can be material, humans...). In this sense, if Ahmed and von Maur join forces it is because of a shared concern for the orientations of habits according to the forms of life.

Again, in dynamical systems' terms, orientation follows the flow of intensities according to differential relations. However, at the social scale, this impulse may find normative affordances that sometimes repress it, deliberately ignore it or try to reconduct it. Thus, to feel disorientated is to feel a queer, strange moment: is to feel a moment of both horror and frustration; although it can also be an opportunity for feeling and acknowledging that there are more possible paths than the imposed (Ahmed, 2006, p. 4).

Specifically, von Maur brings Ahmed's concern to the cognitive sciences in the field of affectivity. In it, she stresses that the capacity of agents to disclose new meanings in conjunction with the environment and other agents occurs in a situated and cultural-historical context in which many mechanisms of "re-orientation" play a role (von Maur, 2021). In claiming so, von Maur does a double critique. On the one hand, a broad and long-term approach to the study of affectivity is being called for. But on the other hand, there is an underlying claim for the potential to observe and generate meanings-disclosure by moving away from looking at affect from conceptions focused on functional tasks in the here-and-now: "In both ways [to conceptualise emotions as strategies for manipulating the environment and to focus on emotion regulation through an active manipulation of the environment] emotions and environment are considered regarding their functional aspect- emotions as strategies or a resource to be regulated, and the environment as a functional niche or scaffold" (von

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<sup>95</sup> Let us recall that Peirce, against the dogmas of co-ordination or necessity, advocated that chance should also be taken into account; for him it was even elevated to a metaphysical principle (Peirce, 1891, CP 6.613).



Maur, 2021, p. 3). So, here I fully agree, as von Maur observes this emphasis on cognitive study as a mechanism to solve task-relevant engagements.

But there are even more similarities between her approach and the one of Deleuze. Just as following the critique of the dialectic of identity, von Maur and Ahmed denounce the loss of real richness and diversity. Against this, they both seem to repeat the maxim that "beneath the general operation of laws, however, there always remains the play of singularities" (Deleuze, 1968, p. 25). The different orientations are silenced and repressed forces, but never completely eliminated. In a context where diversity appears to be out of sync, and hegemony appears to be re-orienting, destabilisation and disharmony necessarily arises, if not external and social, then internal to the agents. Therefore, to have the whole picture in terms of cognition and forms of living we can't restrict ourselves to equate cognition with attunement.

With their concerns, we come to the conclusion that for cognitive science it is not enough to use long-term and contextual factors just as variables that help to explain deterministically how an agent arrives at a given situation. Rather, we need to analyse critically what these contexts *try* to impose and what they prohibit in order to see what hegemonic routes are *intended* to guide the relentless and unstoppable movements of expression. As the concept of orientation/reorientation suggests, hegemony does not stagnate, but guides creativity and meaning-making. *Rethinking how diachronic-cultural factors intervene, however, becomes somehow a way of disclosing possible meaning-disclosings that were marginalised.* Undoubtedly, the social dimension that this cognitive concern takes on, links perfectly with the Deleuzian concern.

However, if there is one thing I would like to suggest to her proposal, it is how to approach the problem of "lack of affective understanding" (von Maur, 2022); in her words: "a crucial epistemic problem is that subjects often do not even enter a process of understanding in different ways than the familiar one" (p. 859). Because, personally, I think that we can reread this problem following Deleuze' conception of habits.

According to this, we cannot say that someone is stuck or does not see things differently. It might be true that access or communication between two affective agents might become more and more difficult and more distant. From a communicative distance or impossibility, it might seem that the other has not changed. But this is not the case according to Deleuze. Instead, we should rather talk about the spiral of habit or the orientation of his or her thinking. According to Deleuze, in incomprehension or in extreme different ways of being oriented in the world what might be happening is not a lack of change by one or both of the agents, but rather a spiral in its patterns.

What may be missing that is seen as the other's non-communicative or non-affective stand is the other openness to new and radically different understandings. What is specially happening in spirals of habits is that new

elements such as new affordances are appearing and being integrated under the same understanding. That is, specialised, precise and detailed affordances appear but that move towards deepening the same schema instead of toward the directions of other agents. In fact, it is through this mechanism that, in its greatest defect, phenomena of *radicalisation* are produced, which are nothing more than phenomena of deepening; or what is the same according to the double law of habit: *greater perceptual insensitivity at the same time as greater active intensity*. In this sense, a long-perspective consideration, as von Maur herself claims, could help us disclose these hazardous spirals.

#### **4.2.2 Possible Lines of Research in Post-Cognitivism**

The point has been made. Now it only remains for post-cognitivist authors, especially those defending the relevance of habit, to discuss the integration of Deleuzian philosophy in their fields. As has been seen, my aim has been to touch upon the core of post-cognitivism, namely its habit-based epistemology. About this, Deleuze's philosophy has dissolved the habit-goal dualism, revealing that habits are fundamentally flexible, non-mechanical and richness/specialisation-generators, thus, more akin to Darwin than to a computational-Watsonian conception. This has been based on a philosophical concern where the "*repetition of difference*", and not the focus on the "reduction of difference" or the "repetition of the same", is what runs through all ontology down to our most mundane habits.

However, Deleuze's system has many more implications for the field of cognitive science. In the following, I conclude this thesis by providing a list of possible areas of influence on other current discussions of post-cognitivism. I hope that this will stimulate their development and contribute to the discussion from a complementary perspective.

##### **1. Dynamical systems:**

First of all, Deleuze's habit has been based on an ontology of intensities based on dynamical systems' theory. Habits are the basis of any form of organisation and they are operational clusters made of intensity flows. These terms made Deleuze to be extremely compatible with many of the contemporary authors who are currently following dynamical systems' approach (Badcock, Bruineberg, Chemero, Di Paolo, Rietveld...). However, Deleuze turns them on its head. For him was an ontology based on the constant differential relations occurring beneath organisations. Hence, the organised process is not an end, but an event whose implications are precisely that of deepening and differentiating the field of affordances.

Yet, notably, I think Deleuze can be useful for the question of affordances brought to high-cognitive processes as already suggested (Bruineberg & Rietveld, 2014; Kiverstein & Rietveld 2015; Rietveld et al., 2018). On the other hand,

Deleuze revises what metastability means. For him, metastability is not a way to maintain equilibrium or grip with the environment, nor a way of predictively accommodating exploration-conservation behaviours (as suggested by Allen & Friston, 2018; Badcock et al., 2019; Friston et al., 2017; Kiverstein et al., 2015, 2022). Metastability is an event that reflects the fundamental tensioned dynamics of territorialization-deterritorialization; there is no need to appeal to an end-goal dynamic of uncertainty reduction. All this points towards a conception of non-epicyclic metastability, which seems to be becoming embedded in the latest versions of Di Paolo (2021, 2022).

In any case, the exposition of habit processes under this new ontology, especially in phenomena of high-order cognitive processes, becomes something relevant to which I will like to devote myself in the future.

## **2. De-hierarchisation:**

Deleuze's philosophy can also be in relation to the analysis of concrete interactions between various cognitive aspects, whether at the scale of brain modules or at scales involving different systems that coexist within the organism such as interoceptive, exteroceptive, motor or perceptual systems. The intertwining of these systems is clear for all post-cognitivism, but often the form of their interrelationship is conceived only as hierarchical (Badcock et al., 2019). It might be a complementary contribution to look at "random" non-hierarchical interactions and disruptions between systems, given that their effects may underlie non-goal-oriented behaviours. As clashes, saturations, synchronisations, resonances, propulsions or bifurcations occur, habits can include *cranky alignments* and a multi-track historicity of interactions (Slaby et al., 2019, p. 8).

In this regard, I give as an example *the entropic brain theory* and *the anarchic brain*, which studies neuronal connections under the use of psychedelic substances as extreme moments of deterritorialisation (Carhart-Harris et al., 2014; Carhart-Harris & Friston, 2019). While it is true that their proposal serves to show how precisely a hierarchical connectivity is somehow present in our everyday lives (although also shown as an extreme case, see Carhart-Harris & Friston, 2019; Friston, 2022), we also understand that these anarchic processes happen to a greater or lesser degree. Extreme functional hierarchization is also utopical even dysfunctional (Friston, 2022).

Completely anarchical and completely hierarchical are two extreme configurations. Daily life connectivity might be a continuum between both. After all, the description of cognition should not be confused with the description of phenomena considered optimal. In the same way, divergent phenomena and orientations, to a greater or lesser extent present in the lives of agents, should not be evaluated with respect to optimal phenomena.

## **3. Marginal cognition:**

Deleuze's philosophy believes that as a rhizome, there are forms of action, thought or perception that escape the standard intensive circuit, that is, that do not properly belong to the operational closure, that are not totally subsumed in an act of total coherence. Beneath the coherence there is the activity of singularities. I call this "*marginal cognition*", or cognition in the margins.

As has been commented on occasion, with Deleuze's proposal I have emphasised neurophenomenological description as a way of combining neuroscience and introspection in order to see the complexity, even the crankiness or spontaneity of some of our reasoning, ideas or perceptions. Is an area of study to be developed. But one example of research on this is Petitmengin's research on micro-perceptions. She analyses ideas and perceptions happening in the first milliseconds, when ideas have not yet been given discourse and functionality (Petitmengin, 2017).

Along these lines but in another field of research, Deleuze can expand the discussion on inner speech (Martínez-Manrique & Vicente, 2010; Bermúdez, 2018; Carruthers, 2018). Do we necessarily think in words? Are there forms of thought perhaps not so reflexive that do not need the form of structured syntax, but that nevertheless can be conscious or slightly-conscious? Deleuze's proposal may contribute to the idea that not all internal thought is actually fully articulated linguistically or have a natural language syntax. Moreover, even when articulated linguistically, there may be thought that is not fully organised and clarified in relation to how the system is arranged. From neurophenomenology, it would be a matter of paying more attention and analysing these types of everyday events.

#### **4. Structural theory of representations:**

Deleuze is also hand in hand with the "shift away from thinking of cognitive representations as arbitrary symbols towards thinking of them as icons that replicate structural characteristics of their targets" (Williams & Colling, 2018; 1942). Authors such as Legg (2021) or Hutto (2017), for example, have resorted to the *structural theory* of cortical activation to account for content-free "representations". According to this model, knowledge is a representation of structural relations of the environment (O' Brien & Opie, 2004, 2015; Gładziejewski & Milkowski, 2017; Williams & Colling, 2018). It is something like a topology of intensity differences (distance, speed, temperature, or other qualities). Cognition might lack content, because (neural) activation acts as a map about the intensive distances of things that would be enough for us to navigate the environment.

This works as if the neural representation is dedicated to mapping the state of affordances outside, without the need to involve content in it. As if it is only dedicated to mapping singularities or relations ( $dy/dx$ ) on concrete aspects. Still, in more embodied terms, let us say that while the brain would be the place where much of the mapping of features takes place, this does not exclude that

the pattern must involve other activations distributed throughout the body. In the end, for Deleuze it will not be that the internal structure mirrors the external one, but that cognition is (/happens in) the complementarity of these "two" patterns. That is, *cognition is when "both" patterns, the internal and external, establish a continuity, an operational closure: a habit.*

## **5. Affectivity:**

Affectivity is a fundamental aspect throughout Deleuze's work, so I think his texts can contribute to present discussions. However, it is less so in *Difference and Repetition* (1968), which has been the major source of this thesis.

Affectivity in Deleuze is distinguished from pleasure and emotion, because affectivity is not a conscious or conceptualised feeling. For Deleuze, affectivity is like *desire*, is a generative force that always seeks to continue to grow and expand. Affectivity is the mechanism by which agents connect and communicate, therefore, open up collective meanings. But affectivity is also the fuel that dissolves some arrangements. In Deleuze's dynamical systems terms, affectivity would be the "*f*" in  $dy/dx$ . In a fundamental sense, affectivity equals cognition as they are at the basis of any meaning-disclosing, thus, being prior to a calculative and reflexive type of cognition.

Particularly, in *Anti-Oedipus* (1972) and *A Thousand Plateaus* (1980), Deleuze together with F. Guattari develops a theory of desire as a force that cuts across all spheres of life, including politics, economics, culture and sexuality. In this sense, affectivity is not limited to the individual sphere, but is a social and collective phenomenon that can be a source of both liberation and oppression. Indeed, in his early work, Deleuze analysed Hume, topoint out that his theory was distinguished from cartesian cognition, by conceiving that "the aim of comprehension consists precisely in making a passion sociable and social an interest" (Deleuze, 1953, p. 12).<sup>96</sup>

## **6. Scaffolding and by-products:**

There are already some examples in post-cognitivism of conceptual tools that can help to avoid attunement normativity. For example, the by-product approach inside niche construction theory remains neutral to harmonic teleology. The view on by-products considers that the transformation of the environmental niche actively involves many unintentional and unconsidered coordinations resulting

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<sup>96</sup> "For Hume it is a question of *replacing a psychology of the spirit by a psychology of the affections of the spirit*. [...] Only a psychology of the affections can construct the true science of human. [...] The *Treatise on human nature must* show that the two forms under which the spirit is *affected* are essentially the *passional* and the *social*. On the one hand, society demands from each of its members, expects from them, the exercise of constant reactions, the presence of passions capable of providing motives and ends, collective or particular characters. On the other hand, the passions involve society as an oblique means of satisfying themselves" (Deleuze, 1953, p.11).

from elements that unintentionally scaffold on other elements (Laland et al., 2016, p. 194). By-products were considered by Deleuze, evolutionary relevant.

However, probably, the concept of *scaffolding* (Clark, 1997; Sterelny, 2010; Colombetti & Krueger, 2015; Stephan, 2018) is the best example. Scaffoldings can be understood as a concept that "simply" suggests that agents use, climb over or are propelled by other material or symbolic dispositions that help them to access, intentionally or not, other possibilities of agency, some even yet to be discovered.

Unlike positions such as extendedness (Clark, 2008), scaffold theory does not consider affordances to be *constitutive* of the agent, as everything is considered to be a more precarious and dynamic system (Sterelny, 2010; Stephan, 2018). Nor does it always imply that the motive of scaffolds is to arrange themselves to find certain balances or adjustments in the environment. Adjustments may happen, but it is not indispensable for something to be considered a cognitive scaffold.

Deleuze's ontology of affordances and consequently the processes of habit differentiation have much to do with the theory of scaffolding. Deleuze considers that the agent arises out of a sea of different affordances. As the agent scaffolds on other agents, materials or symbols, the agent can enter into "new worlds of possibilities" that enhance new cognitive tasks. That is, according to the double law of habit when pseudo-repeating a specific pattern of affordances, we are flowing through a particular arrangement of the environment but having the opportunity to encounter new and deeper affordances. It projects us towards another ability, since by attending to certain tasks more easily, we gain access to new problems. In other words, when scaffolding on the old pattern differentiated and specialised ones emerge.

On the other hand, it is relevant to acknowledge that there is already an alertness in proponents of scaffolding who follow an epistemology of attunement regarding normative issues. Particularly, they conceive that the power of coordination may enhance bad consequences. Notably, Slaby's concept of "mind-invasion" (2016) emerges for putting emphasis on the fact that loop dynamics of socio-normative adjustment can serve as a way of synchronising, calibrating and controlling social or communal doings. His point is that attunement can be deliberately used to endanger behavioural diversity.<sup>97</sup>

Be that as it may, the scaffolding theory has been recently focusing on offering lists of criterias and varieties of scaffolding relationships (Colombetti & Krueger 2015; Coninx & Stephan, 2021; Saarinen, 2020; Stephan & Walter, 2020). These lists I think can be extended to infinity as we unfold complexity and nuances in cognition. After all, such a variety of relationships responds to the

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<sup>97</sup>While exposing Deleuze (§4), it will be shown how appropriate it is to be alert against deliberate processes of control (also known as process of "territorialization") that disturb the flow of communication and development, but will also be shown that the controlling forces will *fundamentally* never achieve their goal.

where-question of cognition and to varieties of task-related engagements. In this sense, the scaffolding theory reflects the attempt to go after cognitive relations in order to model it. In contrast to this, internal mechanisms of proliferation of new relationships and of growth of forms of life may respond to another kind of approach: we might need an immanent approach of the development of cognition distinct from precise, combinable and reconstructible categorisations, that is, distinct from a whole system of epicycles. Dealing with habits in a Deleuzian way may give the key.

## **7. Assemblages and Events:**

Any neurocognitive or cognitive theory can be facilitated by moving to the conception of time and space as contraction. That means to stop treating events atomistically as defined and isolable moments. Instead, the shift proposed is to *understand events as assemblages of properties in transition*, as precarious organisations, as the flow in the net of affordances. Even from predictive processing, some have already tried this (Butz et al., 2021).

Furthermore, as far as participatory senses or social events are concerned, it may be important to treat them as dynamical assemblages, i.e. as moments of territorialisation in a sea of differential intensities. This can help to understand the components of the assemblages, their emergent dynamics, and the participatory sense that emerges exclusively in communion (Colombetti & Roberts, 2015; Di Paolo, Cuffari & De Jaegher, 2018; Stephan & Walter, 2020). But importantly, assemblage's perspective through Deleuze, broadens the vision to understand that the action that an assemblage generates in the environment and what underlies this assemblage, are incessant movements of deterritorialization.

The dynamics Deleuze suggested for assemblages, such as resonances, interferences, jumps, de-hierarchisation or moments of bifurcation, can open up suggestions for studies of collective affectivity, as indeed has been already attempted (Protevi, 2009; Mühlhoff, 2015; Slaby et al., 2019).

## **8. Life-mind continuity:**

In this current debate about the possibility of de-anthropomorphising cognition and even bringing it into apparently non-sentient living organisms, Deleuze's idea of "larval subjects" can add fuel to the fire. As we have seen, Deleuze's proposal consists of pointing to the multitude of habits that make up an organisation. All of them, on different temporal or spatial scales, follow mechanisms analogous to the constitution of events observed as self-organised. After all, basic minds as well as human conscious agents, are based on the consumption of properties not necessarily bound into stable objects: all agencies experience diffusion fields, intensity gradients, oscillations, and fluctuations (DeLanda, 2021, p. 117).

In this sense, Deleuze's ontology can be perfectly introduced to the current discussion revolving around how Markov blankets should be considered: whether as ontological events or as instrumental concepts. Underlying this are cutting-hedge discussions regarding if they are applicable to artificial agents and about the statistical origin of the Markov blanket idea and its possible subsumption or not to the laws of the Free-energy Principle (Bruinenberg et al., 2022; Kirchhoff & Kiverstein, 2019; Kirchhoff & Froese, 2017; Seth et al., 2022).

## **9. The role of the ideal self:**

Something very important in Deleuze's cognitive-ontological theory is the "virtual-focus" which has the function of an "ideal-self" (Deleuze, 1968, p. 133). As I said, Deleuze develops the ontology of Difference in three explanatory steps. The third is a stage that expresses the origin and the end of difference as a repetition. The first step was indeed that of the Habitus which has occupied this thesis. But in describing the second synthesis, which rests on Habitus (as a transit between the first and the third), Deleuze speaks of the distance that is created between two parallel developments of organisms: *the virtual focus of the self* and *self's tendency to auto-reflect* (Deleuze, 1968, p. 133, p. 157).

In other words, Deleuze comes to explain that organisational patterns, but especially human subjects, bifurcate into two main tendencies through the development of habit. One point towards offering us an image of ourselves, to offer us a discourse and a sentience. This creates a reflexive position: our "I" (*Je/Ich*). The other direction goes in order to observe others and think of them as agents that relate to our *I*. What this second direction does is to construct the event that I think I am: our "Me" (*Moi/Mich*).

In less abstract terms, what it comes down to is how the most conscious agents are strongly traversed by these "false" images of ourselves or *Me*. As postmodern philosophers have pointed out, these are images that are easily altered in societies such as ours, where we are more concerned with fulfilling a certain ideal of ourselves in relation to what we think the others expect of "ourselves". This points out that the dynamics are not so much based on balance or attunement of a self or an I, but our agency is fully traversed by the generation and pursuit of fictional identities shown in culture and in other agents and that build our *Me*.

Certainly, positions close to psychoanalysis have developed these themes, but perhaps more interestingly, some constructivist psychological research, such as the personal construct theory of G. Kelly (1955), works with the ideal-self factor as fundamental to making sense of our agency.

## **10. Qualia:**

Finally, and surely the most speculative topic of all, Deleuze also devoted a few pages to *qualia*. For the French philosopher, *qualia are what cover intensities*.



For intensities always live under some other extension or space, however flimsy this extension may be. More concretely, *qualia* would be the form according to which agents perceive the intensities of things (Deleuze, 1968, p. 345-6). And as in Deleuze's structuralism, the perceived quality happens as a function of where the corresponding degree of intensity is located within the spectrum of affordances that the agent has for that intensity. Thus, for example, there would be a spectrum of calorific intensity generated from the affordances in which the organism lives and *qualia* would be the perception of a concrete intensity within that spectrum.

Even though it is an obscure topic. Deleuze's theory, close to structuralism, to the theory of affordances and to that of dynamic systems, points towards the idea that *qualia* is not something generated in the brain. His position is, on the one hand, realist in the sense that the substrate is in the intensities themselves, as the substrate of the world. But on the other hand, these intensities only appear qualitatively in the structuring movement between agent and world, i.e. when a pattern of intensities is established, i.e. in habit.

## 5. Conclusion: Lines of Flight in Normativity

### 5.1. Summary

We have reached the end. With all that has been said so far, I consider Deleuze to be introduced in the cognitive sciences. It is only a first presentation, but one that has tried to go into the deepest core of the theoretical architecture of post-cognitivism: the concept of habit. For my part, I take as my main challenge to develop Deleuze's proposal in dialogue with contemporary philosophers of habits and in dialogue with proposals related to the *free-energy principle* and *predictive engagement*. As I have argued, the mechanism of habit is implicitly crucial for the actual authors of post-cognitivism. However, the post-cognitivism concept of habit carries with it a "Watsonian version". This implies that the epistemology of cognitive subjects is considered to be exclusively aimed at fulfilling the functions of adjustment and prediction. This is opposed to habits, as developed more than 50 years ago by G. Deleuze.

In my opinion, it is very surprising that an author with so many points of similarity has been completely missing from the cognitive sciences and especially from the post-cognitive paradigm. The exercise to introduce him has been to delve into the depths of post-cognitivism, and even of the cognitive sciences in general, carrying out something like archaeology that would take us to the neuralgic point, to touch the bone. Thus, this thesis is a double work. It is first and foremost an archaeology of post-cognitivism, which unravels its entrails from contemporary authors and which manages to trace that at its origin there is a particular conception of habits. In other words, the concept of habit is at the basis of post-cognitivism, but it is a particular conception of habit. At the same time, there is another work that consists of showing the possibilities of Deleuze, since it is precisely he who has had a dissident position, an alternative conception of habit that has not been contemplated.

Thus, precisely because the concept of habit underlies post-cognitivism and Deleuze, I argue that this work is not merely a critique of post-cognitivist actuality, but it points towards another normativity for cognitive science. It aims to understand living organisation, cognition, intersubjective communication, "adaptation", participation, cooperation and creativity, in a different way: based on the dynamics of what a habit is as Deleuze shows it to be. So, let me consolidate once again, in a synthetic way, what I have wanted to say through this thesis, to finally point to some of the open questions that are drawn from this new normativity for the cognitive sciences.

Indeed, chapter §2 was devoted to introducing, in two different ways, how fundamental the concept of habit is for post-cognitivism. The first section (§2.1) took a general snapshot of the present of post-cognitivism. This was done by showing the discrepancies and the different perspectives and various issues that occupy the current authors in this field. A common motto is that "cognition does

not only happen in the head". However, this is a minimal definition. Where it happens, how it happens and the methodology to analyse it is an open field. We mainly identify three disputes as the ones that generate the most internal discrepancies in post-cognitivism: a) the problem of what constitutes a cognitive act, b) the problem of whether representations exist, and c) the problem of where the limits of the core of agency of the cognitive subject (inseparable of his affectivity and its *Umwelt*) lie.

In short, I think that post-cognitivism is plagued by (in)-definitions that do justice to its dynamic, relational and diluted character, but in the face of all of this, the importance of the concept of habit as basic for cognition underlies it. Thus, despite any position in the disputes or even despite its "indefinition" answers, post-cognitivism can be clearly characterised as a *habit-based epistemology*. However, its concept of habit is curiously not always made explicit, and when it is, it is taken as just another process. Thus, in this thesis, I propose to analyse what lies behind this *particular* habit-based epistemology. But before we go into it, I moved on to a second analysis, a historical one.

This second analysis (§2.2) became a genealogy of post-cognitivism. The main question was: why is the mechanism of habit a fundamental resource of post-cognitivism, but not made explicit? We entered into a work of archaeology. To put it very crudely, an analytical and computational strand, mainly Anglo-Saxon, and a dialectical and hermeneutic strand, mainly developed in Germany, coincide in defending pragmatism and the importance of context, but under identical premises of optimisation and economy.

On the one hand, in the mid-19th century, in Peirce, James and even Dewey, we see the concept of habit explicit. This has a double function. On the one hand, it defends a dynamic and not a static or representationalist conception, and on the other, it serves as a nexus to unite body and world, laws and chaos, determination and indeterminacy, the physical and the qualitative, the individual and the social. Darwin himself was involved in this line at this time: habits are the organic mechanism that combine spontaneity and mutation with organisation. This conception led to the emergence, at the beginning of the 20th century, of conceptions that attempted to reduce one of the poles to the other. In particular, and with more practical and scientific legitimisation, behaviourism arose, which reduced everything to physical behaviour and adjustment mechanisms based on punishment and reward. In parallel, on the European continent, what most affects the cognitive sciences nowadays is the evolution of logicism towards linguistic pragmatism and the importance of context. We see this in Husserl, Heidegger, and we end up seeing it in the debates about the irreducibility of experience and language to logic, notably, between the years 1930-50, with A. Turing, W. McCulloch, J. von Neumann or K. Gödel.

Finally, at the end of the Allied-Axis war, the 1950s brought convergence on both lines. Pragmatism reasserted itself. We have the linguistic proposal of the

"second" Wittgenstein, Merleau-Ponty's embodied epistemology of perception and Heidegger's analyses of culture, but we also have the first logical structures serve to construct feedback loops architectures such as Ashby's *Homeostat* (1947), Walter's *Mechanical Turtle* (1951) and Rosenblatt's *Perceptron* (1957). What succeeds is a dynamic and *adaptive* way of understanding cognition. *Habits become mechanised patterns of action through optimal logico-symbolic routes or automatic behaviours.* From the history of the concept of habit, we are no longer at the point of the early twentieth century. In the second half of the twentieth century, habits corroborates its presence and relevance, but habit is placed in a concrete part of the cognitive process. There I wrote: "*If behaviourism and logicism were dissident positions with respect to the characteristic habit of pragmatism and phenomenology from the early philosophers, then they became the hegemony of cognitive science by integrating this concept*".

As an heir to this, the cognitive sciences emerged. First the generation of N. Chomsky, D. Davidson, H. Putnam, W. O. Quine, W. Sellars, among many others, questioning concepts such as *mental states, intentions* and *self-awareness*. A little later, J.J. Gibson, F. Varela, J. Fodor, T. Nagel, p. e. hold revisionism and Darwinism (adaptationism) as the main notes, while cybernetics advances along the same lines. Finally, it was in the 1990s that post-cognitivism appeared, although not called as such, but under concepts such as embodiment, enactivism, which would later be grouped under the 4Es. The paradox is that this last proposal was raised defining human cognition as irreducible to computation. But this is ambiguous: is this irreducibility due to context? Clearly, theoretically not. Cybernetics, although it has not succeeded yet in imitating the human situation and corporeality, has this clear objective and is moving towards it. So does post-cognitivism adopt a position that defends a special quality of the human being? Certainly not. If so, it would be even more dualistic and Cartesian than what it wants to criticise. This raises a hard problem. In the end, what I am arguing here is that post-cognitivism is all of the above, and it does not know how to get out of these theoretical junctures, (as also exposed in §2.1).

Post-cognitivism passes through a particular pragmatism that is more closely related to behaviourism than to the older proposals. Moreover, the adaptationist basis as the only reading of evolutionism or Darwinism further adulterates the interpretation. That defines what I called a "Watsonian conception of habit". Hence, even the concepts of dialectics, hermeneutics, subject-environment adaptation, are always understood under optimisation premises. It is as if there were a principle of functional economy at the base. As if "the invisible hand of supply and demand" were at work in all systems: there is no fundamental difference between the extremely cybernetic feedback loops and the embodied dialectical-hermeneutic vision. Two large analytical and continental blocks argue but share the same concept of habit.

What about all this? Well, Chp. §3, notes that post-cognitivism is defined by much more than the premise that "cognition doesn't just happen in the head"?

Post-cognitivism is defined by being a habit-based epistemology. This chapter takes a broad look at current authors and uncovers some of the assumptions of this particular habit-based epistemology. It encompasses them in two blocks: the epistemology of attunement and the epistemology of prediction (under them, an implicit distinction between habit and goal, a habit-goal dualism).

Under this analysis, the works of the authors Noë, Hutto and Heras-Escribano are representative of the first block. It is noted and then discussed that their philosophy is based on an agent epistemology centred and focused on adaptivity or the importance of coordinations and cooperations. As if the goal of cognition were only this. So, I recognise the importance and centrality of this for cognition, but this cannot be confused with the sole principle or sole end of cognition. In fact, such assumptions only postpone the scientific concern about daily human cognitive richness and complexity. Thus, this section has suggested the assumptions that go hand in hand with the study based on an *epistemology of attunement*, namely, that cognition focuses exclusively to 1) *coordinated, harmonical engagements*, also to 2) *task-relevant engagements* and 3) *exalts adaptationism* over the general theoretical framework of Darwinism or evolutionism.

As an analysis of the epistemology of prediction, K. Friston, S. Gallagher and the research team of J. Bruineberg, J. Kiverstein and E. Rietveld are discussed. Here we present current developments in *predictive mind* and the application of the *free-energy principle* in the cognitive domain. We show that this, on the one hand, was an obvious consequence of the historical computational-dialectical history based on optimisation and pragmatism. On the other hand, we show how the same premises of attunement are applicable to the epistemology of prediction. This time, I focus on destabilising the idea that cognition only seeks the equilibrium of the system, analysing 1) the exclusive emphasis on the search for equilibrium (homeostasis), which in turn is justified on the basis of the free-energy principle; and 2) the problem that this entails when it is proposed to define what motivation is. In short, it is observed that free-energy minimisation offers us a cognitive goal. This principle is questioned on neuroscientific as well as theoretical grounds. The question remains as to whether the free-energy principle is the only principle that can act, as well as on what time scale it acts. For this discussion, the question of meta-stability also arises, and how it is not just another loop, another cycle, another strategy, in the style of Ptolemy's epicycles, if it is still based on the premises of attunement and prediction.

In the end, both epistemologies are two sides of the same coin, which is a particular conception of a habit-based epistemology. What is perhaps most relevant is that it is a habit less Darwinian, in its full sense, and more Watsonian. Both the consequences in computational science (including its popular exposition exemplified by the Microsoft CEO's speech) and philosophically under claims of a situated, embodied, enactivist subject, engaging in an epistemology of attunement or prediction, are entirely comparable. At the

base is the Watsonian conception of habit, or in other words, at the base is a habit-goal dualism. Although post-cognitivism is focusing all its efforts on overcoming dualisms (subject-object, mind-brain, brain-body, organism-environment, perception-cognition...and a long etcetera), I claim that the very important habit-goal dualism is neglected. All of this, in our opinion, is based on the assumptions of a Hegelian *dialectic of identity*. The need to seek balance, adjustment (free-energy principle as the main naturalised and physical motor of balance and attunement, and homeostasis, which comes from extending the idea of the predictive brain). And that has led to a post-cognitivism centred on these tasks, and above all to focus on a cognition centred on task-relevant engagement, harmonic and optimal encounters.

With Deleuze, however, the opposite is true. This is the subject of chapter 4, where an alternative habit-based epistemology is presented. A long tradition remains in the gutter of the cognitive sciences which is completely ignored and which deals with just another notion of habit (Ravaisson, Bergson, Simondon, also Bateson and Prigogine... and particularly, Deleuze). Deleuze is closer to the philosophy of habit of Peirce, Darwin, James, Husserl or Dewey. And it so happens that, as has been shown, many of Deleuze's ideas, which were kept on the margins of the (American-German) historiography of cognitive science, are now taken up as centres of research. I have added a list of possible research fields of post-cognitivism that can be developed from Deleuze's philosophy (affectivity, structural theory of representations, marginal or cranky thoughts and perceptions, scaffolding theory...). However, I emphasise that his ontology, which is close to the theory of dynamic systems, is perhaps the basis of all the other contributions and is the one that brings it closest to the actuality of post-cognitivism which is currently dealing with the same theory to account for exploration and meta-stability. However, Deleuze approached it with a totally different normativity, completely removed from any hint of habit-goal dualism and its accompanying presuppositions (attunement and prediction).

Deleuze's ontology is based on a principle of Difference and not on "the dialectic of identity". Deleuze criticises the notion of totality and the search for a synthetic identity in traditional philosophy. Dialectics, according to him, tends to reduce the multiplicity of the world to a superior unity or identity. Deleuze argues for an understanding of reality as a generator of multiplicity, emphasising the unstoppable emergence of diversity, difference and singularities. Mainly in his book, *Difference and Repetition*, Deleuze lays the foundations of this philosophy/ontology. From there, he constructs a concept of habit of absolute interest.

Concretely, Deleuze shows us that 1) *habit is the process of differentiation, i.e., of specialisation and deepening*: by repeating itself, habits allow us to specialise, namely, to experience new perceptual nuances and new action opportunities. Also that 2) habits are actions that enhance the *growth of life forms*. And finally, 3) it is *against the habit-goal dualism*. Particularly, it is against the view which

sees habit as the optimised residue of other creative and goal-oriented cognitive functions. Therefore, it is against the view of habit as a mechanical, routinized, automatic and inflexible mechanism.

For Deleuze, habit incorporates creativity and there is no creativity without habit. Also, habit is constitutively flexible, it cannot not be. He also explains radicalisation and specialisation as a spiral of habits. And he dares to deal with microperceptions, as cognitive phenomena that arise spontaneously in our everyday life, that are key to our cognitive richness and that do not have any utility as an end, but are consequences or events that arise from other cognitive or agential acts.

Deleuze was thus an author placed on the margins of a historical drift and whose themes anticipated much of what is now treated in cognitive sciences and especially in post-cognitivism. All in all, I think it is a propitious moment to talk about habitus. In cognitive science and computer science, it is becoming a little more explicit. It is therefore important to discuss this concept. In this way, I also propose a dialogue with four authors whom I see as particularly close to Deleuze (§4.2). These are Di Paolo, Dreyfus, von Maur and Legg. I propose to go a little further with them and deal with their theories but based on Difference and moving a little further away from the epistemology of attunement and prediction.

All in all, I denounced that concepts such as adaptation, homeostasis, dialectics, have been used as principles of economics. This is for me another example of a particular kind of rationality: a technical-instrumental rationality, which sees the world from the point of view of optimisation. Deleuze's gaze emphasises the other side of the coin: growth, expansion and the expansion of diversity. In Deleuze, we see that habit itself is an inherent and propulsive mechanism of the organisation/disorganisation dynamic ("*territorialisation/ deterritorialisation*"), and not only that which agglutinates, routinises or mechanises.

Only in this way do we approach a cognitive science from whose foundations the study of the margins of cognition, or those cognitive acts that escape from what is useful, organically emerges, as well as observing phenomena such as radicalisation, specialisation and the growth of life forms. From Deleuze's main theoretical proposal we extract the idea that there is no distinction between habit and goal. There is no dualism. Failing that, under this dualism, habits are misunderstood. So, my thesis has been devoted to exposing the shortcomings of this habit and its "goals". Habit is thus something that unfolds and creates. It specialises as well as organises itself. It retains as well as distinguishes itself from the rest. It simplifies as well as multiplies. It pigeonholes as well as creates.

And there is still more, because in a "meta-theoretical" sense, with Deleuze's approach we came closer to an "immanent" study of agency and cognition. That is, the possibilities of cognition and its effects are studied as an unfolding or development of habit. What is denounced is that, until now, the complexity of the

cognitive agent and its characteristics of *embodiment*, *situatedness* or *embeddedness*, have been studied as if we were designing a system that describes reality by adding more complex dialectics in the form of epicycles or loop. This last is a "transcendental" or "external" point of view in the sense that it looked at a given organism and then added gears to account for its complexity. The aim of this Ptolemaic study model is not far removed from the theoretical desire to create a harmonious and elegant drawing in the image of a perfectly optimal, symmetrical and balanced mechanism.

## 5.2 Deleuzian Normativity and Sociological Outputs from Cognitive Science

We have reached the end. There is little more to add to the theoretical and theoretical-practical analysis of post-cognitivism (its present and its history). Of all the criticisms, complementarities or proposed drifts, however, Deleuze, above all, emphasised an ideological critique that I have wanted to suggest is at the heart of post-cognitivism.

A formulation, in Deleuze's words, could be found here:

*"[The philosophy of identity] dreams less of acting than of constituting the natural means, the element of an action that goes from the most differentiated to the least differentiated: so it is with the good sense of political economy in the eighteenth century, which sees in the merchant class the natural compensation of extremes, and in the prosperity of commerce, the mechanical process of the equalisation of the parts. It therefore dreams less of acting than of predicting, and of letting action pass from the unforeseeable to the predictable (from the production of differences to their reduction). It is neither contemplative nor active; it is, above all, farsighted. In short, it goes from the part of things to the part of fire: from the differences produced to the differences reduced. It is thermodynamic. [...] Good sense does not deny the difference; on the contrary, it recognizes it; but no more than is necessary to affirm that it is denied, with enough extension and time."*

And I do not hesitate to throw in these words that Nietzsche has already addressed, also mixing a cultural analysis:

*"Instead, under the pressure of that idiosyncrasy, "adaptation" is placed in the foreground, that is, an activity of second rank, a mere reactivity; moreover, life itself has been defined as an internal adaptation, more and more appropriate, to external circumstances. But this ignores the essence of life, its will to power; it overlooks the supremacy of principle possessed by spontaneous, aggressive, invasive forces, creators of new interpretations, of new directions and forms, through the influence of which "adaptation" then follows." (Nietzsche, 1887, II, 114, my translation).*



For my part, in my thesis there is not so much room for deep ideological discussion. I wanted to limit myself to the theoretical analysis of post-cognitivism in order to unravel what normativity, what characteristics and presuppositions implicitly define it. However, I would like to clarify something.

I honestly agree with Deleuze's words. That is, I agree with the critique of the simplistic ideology that motivates "thermodynamic and adaptationist thinking", what I propose here is that "thermodynamics" itself also implies its opposite gesture: certainly, movement, multiplication, diversification... It is a matter of showing that both extremes are necessary, but one has been ignored. Thus, it is not a question of denying the discoveries made under the philosophy of identity. It is not a question of denying the mechanism of adjustment and prediction, or even of delegitimizing the usefulness of its study for the sake of knowing a key element of the organisation, even of the health and prosperity of that organisation. But it is a matter of turning the other cheek. As has been seen, Deleuze anticipates many ideas of 4E cognition or post-cognitivism. By no means, we believe, would he oppose those ideas and their findings. In fact, while emphasising the process of "deterritorialization," for Deleuze this is one and the same gesture (not two distinct moments!) as the gesture of "territorialization." However, he does denounce what is hidden beneath this "good sense", which seeks to reduce the margins, diversity and deviance to social-scientific normativity as if they were elements to be reduced and not so many products with which to extend.

Thus, throughout the thesis, Deleuze's philosophy has made visible the limitations of an understanding of cognition centred on adjustment and prediction. Instead, he has proposed an alternative normativity. It is not necessary to observe cognition under the normativity of the optimum, it is not necessary to assess it in terms of whether it fulfils the goals of adaptation, adjustment, task-relevant engagements, free-energy principle, etc. Deleuze's habitus dissolves the concept of goals or any remnant of teleological conception that may appear and furthermore shows a habitus not as the rigid part of the cognitive scaffolding, but as a flexible, expansive, specialisation-promoting foundation, *in the repetition of which difference is repeated*. To put it in philosophical terms, we see that not only the Deleuzian Habitus, as an abstract object, but the more mundane habits, belong to an ontological system traversed by the "*repetition of difference*", and not by the focus on the "repetition of the same" (attunement) or the "reduction of difference" (prediction).

Having made this more ideological or philosophical point, what is perhaps of much more interest are some more sociological issues of the scope that the cognitive sciences can have in absorbing the Deleuzian perspective. To this I do think it is practical for me to devote a few final lines. So, concretely, there are perhaps four points, the most salient and visible, of what the Deleuzian conception can intrinsically imply within the field of study of the cognitive sciences:

1) A clear confrontation with the positions that distinguish between creativity and habit. With special emphasis on the new technological tools, which, hand in hand with AI or other models of language and learning, sell the idea that detaching ourselves from routine operations leaves us with an intellect free to think and imagine freely <sup>98</sup>. This idea is a chimaera, according to Deleuze's line.

Ideas free of practice are empty. If we can make projections, it is because we have a practical knowledge, a know-how of what we are dealing with. That is to say, and to put it very crudely, it may be the case that at a given moment we can empty our entire arsenal of ideas after a long time of practice. But if we do not continue to work on it routinely, we will not achieve further deepening. Likewise, there are two more arguments or situations. In the first place, it is necessary to see how most of the most recognized artists, instead of projecting, are known for their art in each stroke, for the characteristic style in their know-how and not so much in one or another projection. Moreover, it is known that even they let themselves go as they are doing the process, without knowing beforehand what the final result will be. And the same could be said of the most innovative ideas in scientific or technological fields.

Secondly, there is another type of argument. There is also no denying that there are certain advances, in the form of scaffolding, that free us from certain tasks. However, we soon have to build up a habit of handling these scaffoldings. Perhaps we no longer have to perform certain tasks, but for better perfection (which is where differentiation, deepening and specialisation are produced), it will become a habit to know how to handle ourselves directly from this "level" propitiated by the scaffolding. It is the same structure of the spiral of the habit: a know-how leads us to discover new techniques with which to specialise and achieve things previously unknown. From this, we make another habit. Be that as it may, to speak of habit as equal to routine and to speak of disincarnated creativity is, if not a somewhat alarming idea, in its practice unrealizable and unsustainable by definition.

2) A second point is a cognitive science that opposes the complete hierarchical ordering of cognition. Particularly, I am referring both to the hierarchical ordering within the brain, as well as the one that runs through the nervous system throughout the body. On the one hand, we want to show that this hierarchy is very unstable and is a process of back and forth between the lower and higher strata and with processes of resonance and interference. However, this aspect is more or less recognized by all post-cognitivism. Likewise, from my position, it is also undeniable to recognize a certain hierarchy in the neurological order, as shown, among others, by the model of Felleman and Van Essen.

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<sup>98</sup> These are the words of J. Spataro, corporate vice-president of Microsoft, when presenting GPT-4: "The reality is that people spend a lot of time on drudgery work and tasks that zap our time, our creativity and our energy. *We become separated from the soul of our work*". (see p. 62)

However, it is suggested here that one should be cautious in accepting this hierarchy. As I say, the hierarchy is unstable. But what I most want to denounce here is under what criteria the hierarchical ordering is insisted upon. That is, what kind of functions are taken as a model or as a standard to describe the neural architecture whose structure is then discovered to be hierarchical. It is at this point that the normativity of the optimum, so present in the cognitive sciences, comes into play.

The clear example is shown by an arrangement in the centre of which are the areas furthest away from the processing of basic features of perceptual stimuli. Thus, we find areas dedicated to "high-order processing" such as, for example, the brain's default mode network (DMN). It is in charge of generating events during imagination, reasoning, and planning, when decoupled from the sensorimotor here and now (Cooper, 2021; Stawarczyk et al., 2021).

Of particular interest is that these higher processing areas are often more active or less active than expected according to optimal hierarchical behaviour. What we want to defend here is that the frequency and relevance of this "abnormality" in activity is little studied. That is, this slight overactivity or inactivity is more common than expected by the norm. Thus, at one of its opposite extremes, we have the case where a constant activation of the DMN leads to excessive rumination, loops in thoughts and disconnection with the events of external reality. At the other pole, as pointed out by the "anarchic" brain theories<sup>99</sup>, when extreme alteration occurs via altered states of consciousness (such as psychotropic substances or highly trained states of meditation), a flattening of the hierarchy occurs, leading to highly transformative cognitive experiences for individuals.

As we have been saying, we do not believe that cognition can be reduced to one of the extreme poles (functional or anarchic) any more than it can be reduced to the mechanism of territorialization or deterritorialization. But the great Deleuzian proposal suggests to us: 1) that cognition is both poles, and here we must abstract from normativity, that is, from what we understand by the good, the useful, the functional, the ordered or even the adaptive; our theories cannot exclude other types of (human) cognition; and, what is even more important for me, 2) that a study of our daily life is necessary, which can study the richness of perceptions and thoughts. With the latter, we could see how and in what situations, the extremes of cognitive functioning mentioned above, intersect or relate to each other. After all, everything points to the fact that our daily functioning does not fall into any of the extremes, but rather, in different contexts and actions, works from different points along this continuum. This is perhaps the real challenge of a pragmatic, everyday, situated cognitive science.

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<sup>99</sup> See Carhart-Harris et al., (2014); Carhart-Harris et al., (2016); Carhart-Harris & Friston, (2019), dealt in §3.2 y §4.2.2

3) Linked to the above, almost as a subsection, I propose the study of marginal cognitive phenomena. Even strange, cranky ones. This refers both to spontaneous thoughts or perceptions that may occur in our day to day. Flashbacks, eureka's, cravings. Recovering memories or expressions of the past when we are alone, generating connections between elements, spontaneous ideations, samples of excess that overflow the utilitarian conception? A long etcetera in whose basis we find neuronal connections, possibly dependent on a context or a trigger, which undoubtedly escape any functionality of the here and now. All this, which we could call everyday neurophenomenology, is undoubtedly a huge field to investigate, extremely present in our daily decisions and actions.

4) Finally, the cognitive science propitiated by Deleuze's philosophy, brings us closer to understanding the variety and richness of the free behaviours and free forms of expression in which human agents participate. We observe agents with multiple orientations and ideas, where no type of repression or reorientation is capable of putting an end to the natural (/ontological) process of differentiation.

As I have exposed, in physical, chemical, biological, social scales, we find the mechanism of Deleuzian habitus, namely, the mechanism according to a flow of action is closed in a network of affordances, producing a precarious operational closure. This operational closure generates, necessarily, changes (subtle or abrupt) both internally and externally, making necessarily the network of attractors/affordances change. From this view, Deleuze and as we have argued here, draw implications for the understanding of the more "mundane" habitus. This argues directly for the growing complexification of the forms of life. But, beware, it also warns of the process of radicalization, when the spiral of habitus enters an extreme process without contact with other forms of life or other external affordances that might sufficiently change the pattern of deepening.

While this may escape the reach of the cognitive sciences into a more sociological terrain, I claim that these are but consequences of the way of understanding habit and its role in cognition and agency. In the terms propitiated by Deleuze and dynamical systems theory, we can understand these phenomena also within an intersubjective or cultural scale, level or perspective. As Protevi (2011) indicates: "We need to think in terms of a range of gendering practices that are distributed in a society at various sites (family, school, church, media, playground, sports field ...) .... These multiply-situated gendering practices resonate or clash with each other and with myriad other socializing practices (racializing, "class-ing," "religionizing," "nationalizing," "neighborhoodizing" ["that's the way we roll"] ...)" (p. 12).

These terms may seem abstract, and I believe it is possible to translate them into more pragmatic language. But it should be remarked that lacking a population perspective on the development of expressive and affective capacities, post-cognitivism impoverishes its notion of "cultural scaffolding" even if it takes it into account as one more variable. Therefore, it is necessary to keep in mind

this type of ontological theoretical frameworks, such as the Deleuzian one, in order to be able to get closer to the complexity of cognition and not to leave anything in the margins.

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