UNIVERSIDADE ESTADUAL DE CAMPINAS
INSTITUTO DE FILOSOFIA E CIÊNCIAS HUMANAS

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WHAT IS IT LIKE TO BE AN ENACTIVIST

COMO É SER UM ENATIVISTA

CAMPINAS
2020

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Tese apresentada ao Instituto de Filosofia e Ciências Humanas da Universidade Estadual de Campinas como parte dos requisitos exigidos para obtenção do título de Doutora em Filosofia.

Thesis presented to the Institute of Philosophy and Human Sciences of the University of Campinas in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

Orientador: PROF. DR. MARCO ANTONIO CARON RUFFINO

ESTE TRABALHO CORRESPONDE À VERSÃO FINAL DA TESE DEFENDIDA PELA ALUNA LAURA MACHADO DO NASCIMENTO E ORIENTADA PELO PROF. DR. MARCO ANTONIO CARON RUFFINO.

CAMPINAS
2020

Ficha catalográfica
Universidade Estadual de Campinas
Biblioteca do Instituto de Filosofia e Ciências Humanas
Cecília Maria Jorge Nicolau - CRB 8/3387

N17w

Nascimento, Laura Machado do, 1987-
What is it like to be an enactivist / Laura Machado do Nascimento. – Campinas, SP : [s.n.], 2020.

Orientador: Marco Antonio Caron Ruffino.
Tese (doutorado) – Universidade Estadual de Campinas, Instituto de Filosofia e Ciências Humanas.

1. Filosofia da mente. 2. Filosofia e ciência cognitiva. 3. Consciência. 4. Cognição. 5. Naturalismo. I. Ruffino, Marco Antonio Caron, 1963-. II. Universidade Estadual de Campinas. Instituto de Filosofia e Ciências Humanas. III. Título.

Informações para Biblioteca Digital

Título em outro idioma: Como é ser um enativista
Palavras-chave em inglês:
Philosophy of mind
Philosophy and cognitive science
Consciousness
Cognition
Naturalism
Área de concentração: Filosofia
Titulação: Doutora em Filosofia
Banca examinadora:
Marco Antonio Caron Ruffino [Orientador]
Rogério Passos Severo
Emiliano Boccardi
Ludovic Soutif
Nara Miranda de Figueiredo
Data de defesa: 18-02-2020
Programa de Pós-Graduação: Filosofia

Identificação e informações acadêmicas do(a) aluno(a)
- ORCID do autor: orcid.org/0000-0001-7236-6237
- Currículo Lattes do autor: http://lattes.cnpq.br/2724489033321929

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INSTITUTO DE FILOSOFIA E CIÊNCIAS HUMANAS

A Comissão Julgadora dos trabalhos de Defesa de Tese de Doutorado, composta pelos Professores Doutores a seguir descritos, em sessão pública realizada em 18 de fevereiro de 2020, considerou a candidata Laura Machado do Nascimento aprovada.

Prof. Dr. Marco Antonio Caron Ruffino (presidente)

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A ata de defesa com as respectivas assinaturas dos membros encontra-se no SIGA/Sistema de Fluxo de Dissertações/Teses e na Secretaria do Programa de Pós-Graduação em Filosofia do Instituto de Filosofia e Ciências Humanas.

AGRADECIMENTOS

Mesmo com os desafios que a elaboração de uma tese traz, muitas das dificuldades que enfrentei foram mitigadas pela amizade das pessoas incríveis com quem tive a oportunidade de conviver nos últimos anos. Agradeço:

A minha família, que aceitou e entendeu as peculiaridades da pesquisa acadêmica.

A meus queridos amigos da infância e juventude, que mesmo distantes, continuam sendo parte significativa de minha experiência de vida.

À Bateria Alcalina e seus integrantes, que modificaram a minha experiência de maneira fundamental, a ponto de reverberar também na condução desta tese.

Aos colegas e amigos do IFCH, do CLE e de Barão Geraldo, principalmente àqueles que se dedicaram a uma leitura e discussão mais aprofundadas do meu tema de pesquisa.

Ao Prof. Dr. Marco Ruffino pela confiança e por estimular um ambiente agradável de pesquisa.

Aos servidores da universidade, pelo profissionalismo.

Ao Prof. Dr. Erik Myin e aos colegas de departamento na Universidade da Antuérpia, pelo apoio e oportunidade de intercâmbio de ideias.

Aos professores da banca, agradeço a participação e o comprometimento com a leitura e discussão filosóficas.

Agradeço também ao convênio entre a Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) e a Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP), nos processos #2014/03029-2 e #2016/20284-1, pelo financiamento desta pesquisa nas modalidades Doutorado Regular e Bolsa Estágio de Pesquisa no Exterior (BEPE), respectivamente.

Não basta abrir a janela
Para ver os campos e o rio.
Não é bastante não ser cego
Para ver as árvores e as flores.
É preciso também não ter filosofia nenhuma.
Com filosofia não há árvores: há ideias apenas.

Alberto Caeiro, em Poemas Inconjuntos

RESUMO

Explicar fenômenos mentais tem sido um desafio permanente tanto para filósofos quanto para cientistas. Esta tese oferece razões para considerar o Enativismo, especialmente em suas variantes radicais, como uma abordagem que enquadra fenômenos mentais de maneira frutífera. Para enativistas, não somente o cérebro, como também o corpo inteiro, o ambiente e sua história biológica, tanto no nível filogenético como ontogenético, além de aspectos sociais e culturais, são necessários para a compreensão da cognição. Além de apresentar os principais princípios do Enativismo (capítulos 1 e 2), argumento que as maneiras tradicionais de entender a fenomenalidade enfrentam deficiências que derivam de pressuposições filosóficas errôneas. Mais especificamente, as dificuldades profundas em explicar cientificamente a fenomenalidade surgem de expectativas redutivistas implícitas na pesquisa filosófica e científica sobre a mente (capítulo 3) e de uma concepção distorcida de experiência (capítulo 4). Concluo indicando que uma visão inspirada pelo enativismo é não somente possível como, de fato, uma abordagem promissora para a mente e a cognição.

Palavras-chave: filosofia da mente, filosofia e ciência cognitiva, consciência, cognição, naturalismo

ABSTRACT

Explaining mental phenomena has been a permanent challenge for both scientists and philosophers. This thesis provides reasons to consider Enactivism, specially in its radical variants, as an approach able to fruitfully frame mental phenomena. For enactivists, not only the brain, but the whole body, the environment and the biological history, both in the phylogenetic and the ontogenetic levels, besides social and cultural aspects are necessary for an adequate understanding of cognition. In addition to presenting the main tenets of Enactivism (chapters 1 and 2), I argue that the standard ways according to which phenomenality has been traditionally understood face shortcomings which derive from misleading philosophical assumptions. More specifically, the deep difficulties in scientifically explaining phenomenality stem from implicit reductive expectations in philosophical and scientific research about the mind (chapter 3) and from a distorted conception of experience (chapter 4). As a conclusion, I indicate that an enactivist inspired view for phenomenality is not only possible, but in fact a promising approach for mind and cognition.

Keywords: philosophy of mind, philosophy and cognitive science, consciousness, cognition, naturalism

Summary

INTRODUCTION

The present thesis is the result of the project of providing an assessment of an enactivist view of the phenomenal aspects of experience. Phenomenality, qualia, the raw feeling, or the what is it like of undergoing an experience are all different ways that have been used in the philosophical literature to refer to the properties of experience that make us feel them the way they do. Ordinary experiences specifically feel like something other than nothing: there are differences in the experiences of tasting a coffee or a beer, of listening to music or to a car passing by, or seeing the blue sky or the green grass, and so on. There should be no mystery in this initial way of putting what phenomenality is. Now, the vexing, notoriously hard issue is how to accommodate it within a natural scientific framework, usually referred to as "the hard problem of consciousness". The path of trying to develop an enactivist understanding for phenomenality led me not only to a deeper understanding of enactivism but also to discussions concerning the shortcomings of the available traditional, strict, naturalistic approaches and of the way experience is often characterized in the philosophical debate.

Issues concerning mind and cognition have been oscillating between reductionist materialistic and non-reductive materialistic theories (and combinations among those). A frequent form of reasoning is the following: because of the peculiar properties of mental phenomena, such as phenomenality and intentionality, it is assumed that what is mental cannot be wholly accounted within scientific explanations. Nevertheless, materialistically oriented philosophers and, of course, scientists, keep on looking for the physical substract of mental phenomena. Non-materialistic philosophers claim, however, that if a phenomena has in fact been explained by scientific accounts, then it is not mental anymore, for what is properly mental is necessarily left out from a material explanation. Conversely, whatever is actually materially explained cannot be mental (for example, take the influential arguments from Nagel (1974), Jackson (1983), Kripke (1979), Levine (1983) and most recently,

Chalmers (1996, 2002), who highlighted similar difficulties). Both sides of the debate seem to provide equally compelling arguments: at the same time that mentality seems in fact to exhibit a peculiar behavior, as non-reductive, non-materialistic theorists argue, it seems odd that it does not fit within our scientific understanding of the world. We seem to be stuck between the materialistic and anti-materialistic positions that repeatedly led us to dead ends.

The enactivist framework I present here aims to untangle some of the hard questions that have been posed concerning cognition in general by recasting some deeply entrenched assumptions. I argue, following enactivist insights, that the issues concerning mind are framed in a misleading way, and that is the reason why there is not even a satisfactory characterization of what minds and mental phenomena are. It is indeed possible to develop a scientific and naturalistic account for cognition, but in order to do that, we need first to abandon the idea that there is a clear-cut divide between what is mental and what is physical and that something (supposedly) in the brain bridges those two realms. It is clearer now that, by framing the mind-body problem in terms of the "relation" or "connection" between matter (or, more specifically, the brain) and mind, and other similar terms, we get caught in explanatory traps. The point to be explored in the following is that there is no connection whatsoever between mind and body, because there is no divide.

The naturalistic framework Enactivism offers might be useful to unravel at least some of the problems concerning mind and body. Needless to say, even if it dissolves or does away with some issues, others will immediately appear. So, neither Enactivism (nor this thesis) are supposed to be taken as the definitive answer for the difficult problems at issue here. In an enactivist framework, it is through their bodies and by means of permanent and ongoing engagements with the environment that living beings turn out to be properly cognitive beings. The relations of bodies and environment are always historical, both in phylogenetic and in ontogenetic ways and, in many cases, including the paradigmatic human case, also involve collective aspects, such as social and cultural ones. The fundamental tenet of taking cognition to be constituted by their dynamic involvements with the environment by means of patterns that are dependent on both the phylogenetical (the level of the species) and the ontogenetical (at the level of a particular individual) biological history, with the aid of social and cultural aspects entails important consequences. In other words, the neat separation of what is exclusively mental (what happens in the head) from what is not mental (what happens outside it) no longer exists.

Enactivism is a complex view, and besides taking the biological configuration of bodies as fundamental for cognition, it also takes seriously the involvement of the subject

with normative practices, which brings the need of a sort of pluralism concerning explanation. Enactivism takes humanistic sciences, such as History, Anthropology and Philosophy itself in an equal explanatory foot as the "natural" sciences: Physics, Chemistry, Neurobiology. Without the resources human sciences bring, it is not possible to get a fully adequate grip on experience. As it is discussed along the way, enactivist views might be truly transformative of research about mind.

One of the implications of no longer having a definitive criterion for what is mental and/or properly cognitive, then characterizing cognition might change what are the possible cognitive beings. As an example, take computers. By functioning in terms of discrete representational states, computers, which are sometimes taken to be closer to being cognitive (or intelligent) creatures than, say, bacteria, are not cognitive creatures at all, and are not even close to be. That is because one of the main tenets of Enactivism is the anti-representationalism about basic cognition. Enactivists claim that there is no need nor scientific legitimacy in taking mental representations to be the most basic explanatory entity in explaining cognition. So, in an enactivist view, the activities bacteria perform in its interaction with their environmental niche, even if as basic as pursuing sugar, are active, and can be considered, at least in a basic sense, as proto-cognitive creatures. Differently from computers, bacteria are autonomous beings, who exhibit (some) agency and self-preservation goals. By being properly living forms, in an essentially biological way that is constitutive of cognition, bacteria and plants are closer to human beings than computers. Even if it seems strange and far-fetched to accept bugs and flies to be creatures capable of (basic) cognition, this way of taking cognition is helpful in dismissing questions that have long preoccupied philosophers: are babies and non-human animals capable of any kind of cognition? The enactivist answer is a definite and straightforward yes. By emphasizing the basic features which underlie all lifeforms, such as an existence within a given environmental niche and a specifically biologically configured bodily material substract, it is the dynamic interchanging flow within that complex that allows for and constitute the development of cognitive skills. However, accepting the proximity of plants and humans when it comes to cognition is still met with resistance in many philosophical corners.

The reason for that resistance is more easily understood once we recall the salient aspects of the historically dominant model of cognition. Taking the intellect as the most paradigmatic and defining feature of cognitive beings has somehow distorted the view we have about ourselves and other living beings. The computer metaphor for cognition has lent intellectualism significant success. However, the strategy to decompose cognitive activity,

such as thinking, perceiving, understanding, remembering and imagining, to name a few, in a mechanistic fashion, assuming cognition can be explained as computations on representations, has stumbled upon significant limits.

The association of computational approaches with representational theories to explain the states on which computations are performed seem to be a perfect fit in the attempt to meet the materialistic worries that shape much of contemporary science. The aim is to explain all mental phenomena in terms only of the physical processes that happen in the brain. The fundamental notion is that of *mental representation*. A mental representation maps aspects from the world into the organism's brain, thereby providing a causal connection to the world. It roughly works like this: the sensory organs register the physical information contained in a stimulus. The information is progressively transformed by brain processes, resulting in an abstract model of the world. Based on that virtual, representational model of the world, the organism engages in behavior. Such a structure is sometimes dubbed the *sandwich* view (Hurley, 2001), in which the sensory input and behavioral output are the bread slices, and the filling is the proper cognitive processing of information. There would be, then, a causal connection between mind and world which is perfectly legitimate from a scientific perspective. That basic framework is the standard view in Cognitive Science, and is supposed to explain the peculiar features of cognitive activity, namely, intentionality and phenomenality.

Intentionality is the philosopher's term for the fact that a mental state is about or refers to something. The fact that mental states are intentional has been usually explained by their putative representational nature. Roughly, a mental representation is an internal state that represents aspects from the environment (or the overall state of the organism) as its contents. However it is defined, in richer or cheaper ways, or in various degrees of complexity, a mental representation is often taken as the means by which a subject is veridically connected to the external world. Cognition is then understood as the result of mechanical operations on those internal states.

That is the standard explanation for cognition, exploited by the majority of approaches in Cognitive Science, which assume mental representation and content as basic explanatory entities. Despite its ubiquity – and the belief, stated by some, that there is no way out of the representationalist paradigm (Clark and Toribio, 1994; Clark, 2015; Milkowski, 2015, for example) – there are serious reasons to question the deeply entrenched story sketched above. Despite its ubiquity and variety, the notions of mental representation and content are problematic from a naturalistic point of view. As Haugeland (1990) points out, the

question “is not to doubt or debunk, but to understand” the coexistence of intentionality and physicalism (Haugeland, 1990, p. 385). The challenge has been to find a notion of intentionality that fits within a strict naturalistic view. Even though there have been many attempts, the project of naturalizing intentionality has not been satisfactorily solved as well.

The representationalist framework has neither helped much in illuminating phenomenality, as it was initially expected to. It is usually taken for granted that at least some living beings are connected to the external world in ways which provide them with a specific feeling of what it is like to undergo a specific relation to the world. When that happens, mental states are phenomenally conscious. As indicated before, paradigmatic and relatively uncontroversial examples include perceptual states in the different sensory modalities, even thought that characterization is not exhaustive. Phenomenal states might include not only states of perceptual experience, but also “bodily sensation, mental imagery, emotional experience, occurrent thought and more” (Chalmers, 2002, p. 248). In all those cases, “there is something it is like” (Nagel, 1974) to be in a specific state: to see a red rose, the blue sky or one’s desk, to hear a car’s noise or a symphony, to feel pain, pleasure or sadness. It has been thought that those experiences exhibit special properties which confer them with qualitative aspects, what has been traditionally called qualia. Qualia, that is, the idea that experience has properties that make them ineffable, intrinsic, private and directly or immediately apprehensible in consciousness (as summed up by Dennett, 1991) is a (misleading) way of characterizing the nature of our experiences as if it were possible to abstract properties of them that stand isolated from the embodied patterns of behavior, in yet another display of the pervasiveness of intellectualism about mind.

Even so, it is typically unusual to deny that conscious experiences and their phenomenal aspects exist as well as that physical processes at least in part underlie them. However, it is also true that, while scientific developments in research about the brain impressively bloomed in the last century, and especially in the last 40 years or so, achieving interesting and important results, it has not shed direct light into issues about phenomenality and consciousness, and philosophers and scientists are still far from a satisfactory *scientific* understanding of those phenomena. To maximize the contrasts between scientific achievements and the peculiar features of cognition, consider problems such as cell replication or the structure of the atom: though the details might not yet be fully understood, the basic framework is not alien to anyone familiar with scientific research tools and methods. Consider also the situation of those topics a century ago: research has developed and there has been undeniably significant progress. The situation in scientific and philosophical research

about consciousness has been challenging in a different sense for longer than expected: at the same time that it seems obvious that phenomenal consciousness depends on physical processes, it is not at all clear how to materialistically account for that relationship in a way that preserves its phenomenal peculiarities. The problem is that even if a complete physical theory turns out to be achieved, the question of why should at least some of those physical processes (nowadays often assumed to be the ones that happen in the brain) be conscious remains unexplained, that is, why these physical processes are actually felt by the subjects as such. And this is so no matter how detailed a purely physical account of mental phenomena, including the interactions among atoms and its particles, or even more basic entities to be yet discovered, can be worked out.

According to Chalmers, for example, to take one recent and influential formulation, there are two kinds of problems concerning consciousness, "easy" and "hard" problems of consciousness. The former are more like "puzzles than mysteries" and concern explaining the material basis of activities like the "ability to discriminate stimuli, or to report information, or to monitor internal states, or to control behavior" (Chalmers, 2002, p. 247). In principle, for these phenomena, "there is no obvious obstacle to an eventual explanation [...] in neurobiological or computational terms", that is, they could in principle be explained by the standard research paradigms in cognitive science. The easy problems of consciousness, then, are not "metaphysically baffling", "since they can all be tackled by means of the standard repertoire of cognitive science and explained in terms of computational or neural mechanisms" (Zahavi, 2005, p. 302). Explaining phenomenality, however, that is, why do at least some of those physical processes that happen in the brain are accompanied by a subjective feeling and how those physical processes give rise to consciousness constitute the hard problem. For instance, how to explain the experience of seeing blue in terms of specific physical states? There is nothing about a brain state that necessarily connects it with the very experience of seeing blue. In fact, it is conceivable that there are brain states with no experience at all. As I indicated before, the only consensual assessment concerning phenomenal consciousness is that no available theory satisfactorily explains it (Chalmers, 2018, p. 7).

Perhaps tellingly, Chalmers puts the issue in terms that strongly resemble a Kuhnian analysis for scientific development (Kuhn, 1962). Despite the difficulties of applying Kuhn's notion to the very philosophical issues, it is possible to identify at least some aspects that might be insightful. Currently, consciousness can be regarded as an *anomaly*, in the Kuhnian sense: a phenomenon that defies the explanations from the dominant paradigm. The

difficult situation in philosophy of mind is as such not only because "we lack empirical information of the physical conditions of consciousness; it is that we lack a way of thinking about consciousness that would enable us to say what this empirical information signifies, in particular whether it tells us what consciousness is" (Nagel, 1993, p. 2). According to Kuhn's analysis of scientific development, one indication that a scientific revolution is on the horizon consists in the resilience of a given phenomena to current standard scientific treatments. So, it might be the case that a proper understanding of the phenomena depends on the reconceiving of issues at play.

In fact, many revolutions have been repeatedly announced in cognitive science, and a recent one that has gained significant attention lately, that I examine more thoroughly in this thesis by highlighting its promising aspects, is the enactivist research framework. The publication of *The Embodied Mind*, by Varela, Thompson and Rosch, in 1991, served as an articulation of the enactivist view influencing both philosophical and scientific research about the mind. Its main claim is that "cognition has no ultimate foundation or ground beyond its history of embodiment" (Varela, Thompson and Rosch, 1991, p. xx). They proceed by questioning the widespread representationalist assumption in cognitive science, that is, the standard claim "that cognition consists of the representation of a world that is independent of our perceptual and cognitive capacities by a cognitive system that exists independently of the world" (Varela et al., 1991, p. xx).

According to a general form of enactivism, taking the relationship between body and environment of living organisms to be the ultimately basic grounding relation would lead to a more adequate conception of mind and cognition. However, enactivism is not easily and uniquely characterized. Enactivism, in fact, at least for the moment, denotes "broad frameworks for understanding the basic nature of minds and how they become more elaborate" (Hutto and Myin, 2013, p. 4) rather than a unified doctrine. Even though the different varieties share some of the basic commitments, those can be combined in such a way that there is "a variety of distinct and overlapping "enactivisms", the relations of which are not always clear" (Ward, Silverman and Villalobos, 2017, p. 365). Still, minimal and shared commitments can be identified already in Varela, Thompson and Rosch's book and concern mainly dynamic body-environmental couplings and antirepresentationalism about cognition: "(1) perception consists in perceptually guided action and (2) cognitive structures emerge from the recurrent sensorimotor patterns that allow action to be perceptually guided" (Varela et al., 1991, p. 173).

As briefly mentioned above, Enactivism is an anti-representationalist view. That means that not only there are no mental representations as traditionally posited, but also the main aim of cognitive and perceptual capacities of livings beings is not to *represent* the world as it is. Perception and action are deeply connected and, in fact, one guiding line of Enactivism is the codependence and mutual determination between organisms and environment. Enactivists advance the claim that it is impossible to "separate our history of actions – biological and social – from how the world appears to us" (Maturana and Varela, 1987, p. 23). Thompson, Palacios and Varela (1992) provide illustrating examples, for example, the case of bee vision: due to the bees' sensitivity to ultraviolet wavelengths, flowers that reflect those wavelengths will be more conspicuous than others and then stand a better chance of being selected at the same time that the availability of such flowers impacts on the population of bees. The specificity of the bees' visual system not only determines the possibilities of action in the environment, but also, as they put it, largely contributes "to the very determination of that environment" (Thompson, Palacios and Varela, 1992, p. 20). Organisms "enact", or "bring forth", a world, in dynamical interrelations that depend on various aspects, such as their biological history and configuration.

Ever since the publication of The Embodied Mind, there has been some prominent varieties of enactivisms, such as the Autopoietic Enactivism (Thompson, 2004) and Sensorimotor Enactivism (O'Regan and Noë, 2001) and Radical Enactivism (Hutto and Myin, 2013, 2017, widely know as REC – Radical Enactivist Cognition). I do not mean to provide an exegesis of the varieties of enactivisms and, then, I mainly focus on Hutto and Myin's REC.

Hutto and Myin claim REC to be a more thorough rejection of the representationalist paradigm than other enactivist varieties. REC explores the difficulties of providing a naturalistic explanation for intentionality in terms of full-blown semantically contentful representation, as standard approaches in Cognitive Science do. One of the main points of Enactivism is the proposal of distinguishing two structures for intentionality: *contentless* and *content-involving* intentionality. The former preserves the essential aspect of directedness to the world, but without the commitment to the presupposition that intentionality always involves semantic content. Contentless intentionality, or *ur-intentionality*, is not representational. Ur-intentionality is target-based, that is, it is *about* the world, but it does not have conditions of satisfaction. Content-involving intentionality, in turn, indeed exhibits the familiar semantic properties of reference and truth, but that needs to be understood as a long-term sophisticated achievement developed throughout the organism's

involvement with normative and shared practices. Examples of content-involving intentionality are informative uses of language, such as in propositional language. One of the points that Hutto and Myin (2013, 2017) emphasize is that this latter use should not be taken as the paradigmatic case of intentionality, since it applies only to specific and limited cases that happen, furthermore, in very specific contexts, such as in the human beings engagement in communal, social practices.

For the moment, I just want to highlight that the basis of all cognitive capacities is the active and dynamic engagement of organisms in the environment, that is frequently denied by more standard accounts in cognitive science research, as they claim that representing is the basic and more fundamental cognitive activity living beings perform. REC rejects views of mind which take it to be "some kind of information-processing device that responds selectively to pregiven features of the environment" (Varela et al., 1991, p. 133), in which the pregiven features of the environment figure as semantic contents of representations in basic cognition. Basic, nonrepresentational forms of cognition are spread throughout the spectrum of living beings and can be understood in terms of the skillful and non-mechanistic involvement with the environment. That is in line with a crucial (and often misunderstood) enactivist insight that even very simple living beings might have a cognitive life, though basic[1]. REC argues that "there is no reason to deny cognitive status to noncontentful world-directed activities of living creatures, including ourselves, that are capable of detecting, flexibly tracking, and interacting with salient features of an environment in context-sensitive ways" (Hutto and Myin, 2017, p. 78). REC aims to develop a nuanced account for cognition and its distinction between contentless and content-involving activities tries to capture the important differences there are between "responding to and keeping track of covariant information" and "making contentful claims and judgments that can be correct and incorrect" (Hutto and Myin, 2017, p. x). So, REC displaces the usual distinction of what is cognitive and what is not.

Given REC's claims, what are the consequences for phenomenality? Some prominent advocates for (sensorimotor) enactivism have claimed that the problems of

1 Thompson (2007, p. 126), for example, says that "cognition is behavior in relation to meaning and norms that the system itself enacts or brings forth on the basis of its autonomy". In such a broad characterization of cognition, bacteria could be considered as capable of cognition, or *intelligent*. Recently, even *plant intelligence* has been seriously debated (Calvo, 2016, for example). The consequences of such a broad conception of cognition are not completely clear, and possibly such claims needs to be refined. Obviously, the intelligence of those creatures are not to be measured against human intelligence, for they are probably very much unlike each other. In any case, in my view, Hutto and Myin (2013) provide distinctions that are useful for understanding the variety of cognitive activities that various living beings perform, which depends on their bodies and environmental niches.

phenomenality turn out to be an illusion (O'Regan and Noë, 2001, p. 960) and that the (sensorimotor) enactivist account can bridge the explanatory gap between psychological and physical processes (O'Regan and Noë, 2001, p. 962). Concerning visual experience, one of the most discussed modalities of experience, an enactivist view would seem to involve "adopting a different approach to the problem of visual experience" (O'Regan and Noë, 2001, p. 940), according to which vision is "a way of acting, (…) a particular way of exploring the environment" (O'Regan and Noë, 2001, p. 939). In the sensorimotor enactivist account, the particular qualities of consciousness depend "not only on what is happening in my brain but also on my history and my current position in and interaction with the wider world" (Noë, 2009, p. 9). However, those claims are not uncontroversial, for it is not clear that such an approach is able to solve the explanatory gap, as expressed by critics of enactivism such as Prinz's (2006) puzzlement: "just as it's hard to understand why brain states feel a certain way, it's hard to understand why brain states together with bits of the external environment would feel a certain way" (Prinz, 2006, p. 17). Hutto and Myin (2013), in the proposal of REC, claim that, in fact, just widening the supervenience basis to include not only brains but also body and environment does not solve the hard problems associated with phenomenality. The REC answer depends on its more general and critical view on the fundamental assumption of mainstream cognitive science that all cognition is dependent on semantically contentful representation, from which other forms of Enactivism, including Sensorimotor Enactivism, fall short. REC claims that indeed, the minimal supervenience basis for phenomenality is brain-bound, which can be, *prima facie*, a surprisingly internalist position for enactivists to hold. However, brain activation alone is not sufficient to account for the rich and complex experiences mature human beings go through in their ordinary lives. The richness and complexity are dependent on the ongoing involvement with the social and collective content-constituting practices cognitive beings such as humans participate in. The mere existence of brain activity, though necessary is not sufficient for content-involving capacities.

In a rough summary, issues about conscious experience and its peculiar features that is, its being *of* or *about* something (intentionality), its having a particular qualitative feeling (phenomenality), and its being directly accessible only for one specific organism in its first person perspective (subjectivity) have been addressed by embodied cognitive science more recently. The philosophical debate has long been dominated by the controversy between dualistic and materialistic perspectives in different but closely related matters concerning metaphysics, epistemology and explanation. Metaphysical issues concern the minimal supervenience for mental phenomena (are mental phenomena brain-bound or not, for

example), while epistemological and explanatory issues concern the possibilities of obtaining a satisfactory account for mental phenomena (are natural or scientific reductive explanations of psychological phenomena possible?). Enactivism, arguably, significantly changes the landscape of the debate by questioning the fundamental assumption of cognition as a matter of representing the world as opposed to enabling adaptive forms of interaction.

Hopefully, the effort put here will also shed light on an interesting related question concerning the *meta-problem of consciousness*: "why we think phenomenal consciousness poses a hard problem, or in other terms, the problem of explaining why we think consciousness is hard to explain" (Chalmers, 2018, p. 6). Beneath the more explicit commitments to materialism or dualism, it is possible to identify an underlying view concerning our own understanding of human beings and their epistemological capacities. Very often, materialistic positions are accompanied by the rejection of the existence of God, spiritual entities or properties, and other "metaphysical" entities, as expressed by philosophers such as Hempel and Carnap, according to whom, respectively, "[Physicalism] frequently encounters strong opposition arising from the idea that such analyses violently and considerably reduce the richness of the life of mind or spirit" (Hempel, 1980/1935, p. 21) and "now it is proposed that psychology, which has hitherto been robed in majesty as the theory of spiritual events, be degraded to the status of a part of physics. Doubtless, many will consider this an offensive presumption" (Carnap, 1932/2002, p. 40). Such an attitude has deeply shaped the current world image we are embedded into. In opposition to that, a non-materialistic attitude aims to preserve certain special features of human beings as "the last ditch defense of the inwardness and elusiveness of our mind, a bulwark against creeping mechanism" (Dennett, 1991, p. 386) and the philosopher's task in understanding consciousness, a "last bastion of specialness will be stormed by sciences" (Dennett, 1991, p. 386).[2] Enactivists, in turn, emphasize the deeply biological nature of cognition, and the codependence between organisms and environment taken broadly. It is also possible, then, to question the underlying "strong, often tacit and unquestioned, commitment to a realism or objectivism/subjectivism about the way the world is, what we are, and how we come to know the world" (Varela et al., 1991, p. 9).

So, the debate concerning phenomenality, and mentality in general, does not concern only empirical and scientific issues, but lies at the very heart of the desire of comprehension of human existence and its place in nature. In sum, the existence of

2 Dennett himself actually positions himself against that attitude and the quotations are used just for illustration of the point.

phenomenality (and intentionality) has prevented a more complete and satisfactory success of virtually all the available approaches in science and philosophy of mind that have been hitherto offered, especially materialistic approaches (even though dualistic approaches fare no better and have problems of their own). The aim of the thesis is to develop reasons for thinking it is indeed possible to offer a fully naturalistic approach to cognition, including phenomenality, even though it involves taking social, cultural and historical aspects as a legitimate part of the natural sciences. The notion of "natural" employed in scientific explanations is too often overly strict, which prevents experience to be more adequately understood. At the same time, the notion of "experience" is also too often distorted by the mainstream intellectualism. So, it is necessary to reconceive both our criteria of naturalistic explanation as well as the way we conceive of experience. Chapter 1 presents a brief history of Enactivism and describes its main inspirations throughout recent philosophy. Chapter 2 discusses the shortcomings with representationalist theories of cognition. Chapter 3 discusses what a broadly naturalistically acceptable theory should look like, and argues that strict constraints on naturalism, that have been common in recent history of philosophy are misleading. The point is that core commitments of naturalism, the homogeneity of reality and the continuity of philosophy and the sciences, are compatible with a less demanding, non-reductive form of materialism. Finally, Chapter 4 discusses how the view of experience that is often employed in the literature is a consequence of intellectualist views about the mind.

1. ENACTIVISM

Enactivist views have flourished during the last decades as approaches that aim to understand cognition from within an integrated framework which takes into account not only the brain, but also the rest of the body and the ontogenetic and phylogenetic history of its relationship to the environment. The rejection of representational and computational approaches to cognition and the emphasis on the dynamic interplay of organisms in and with their environmental niches are the key features of enactivist views. Cognition is constituted by organismic activities that encompass, and are mutually determined by, sensorimotor, evolutionary and cultural factors. One way to refer to this framework is as '4E' Cognition: enactive, embodied, embedded and extended (Newen, De Bruin and Gallagher, 2018, for example). The main idea is that "cognition has no ultimate foundation or ground beyond its history of embodiment" (Varela, Thompson and Rosch, 1991, p. xx).

The foregoing goes against traditional and mainstream views in Cognitive Science, which can be described as Representationalist, Computationalist and Neurocentrist. Traditional views assume cognition to be the result of the brain processing of information retrieved by sensory organs. The brain processing of the stimuli information generates as an output a (virtual) internal model of the world which then guides the organisms' behavior. In these views, cognition necessarily depends on the existence of states which represent aspects of the external world (or internal states of the body). Those representational states are contentful, that is, they represent the world to be in some or other way. Hence, they have semantic properties: they can be true or false, accurate or not, and so on.

The input-processing-output structure is supposed to underlie all kinds of cognitive activities. So, from the moving of a finger to abstract reasoning, the informational processing of semantically contentful representations made by the brain is precisely what allows for cognitive activity to happen. For example, in order for me to reach the bottle in

front of me, it is necessary that my brain processes a representational state it instantiates as having the content "there is a bottle next to my computer" and many other representations, such as the rest of the spatial arrangement and my desires and beliefs, and so on. Furthermore, the relation of the representational states is inferential. This very general sketch is the classic way of thinking about cognition (we see in chapter 2 that this model has been amended to weaker versions but not thoroughly abandoned). Cognitive science's fundamental cornerstones are then representationalism, that explains how cognitive states (thought, perception, and imaginings, and so on) get their content, and computationalism, that explains how the many representational mental states inferentially relate to each other. Finally, all the relevant cognitive processes happen in the brain via activation of neurons.

Enactivism challenges this view. Since its articulation in the early 1990s (Varela, Thompson and Rosch, 1991), with inspiration drawn from sources as diverse as Buddhism and the phenomenological tradition, many researchers have worked within this framework. Current influential philosophical varieties of enactivism include Autopoietic Enactivism (Thompson, 2007), Sensorimotor Enactivism (Noë, 2004, 2009) and Radical Enactivism (Hutto and Myin, 2013, 2017). I chose to focus on the Radical Enactivist approach to Cognition, as mainly developed by Hutto and Myin (2013, 2017), because it provides a clear statement of the philosophical commitments and consequences of an enactivist, thoroughly naturalistic attempt to account for cognitive phenomena.

Hutto and Myin's Radical Enactivism (henceforth REC) denies that all cognitive activity can be defined in terms of, and is necessarily dependent on, the representation of the environmental features encountered by organisms. REC rejects semantic mental content and representation as the basic cornerstones of the explanation of cognition because, on their view, those notions are incompatible with a thoroughly naturalistic view of cognition. REC claims it is possible to fully account for cognition with no explanatory residue without the problematic notions of mental content and representation. The key is to understand cognition "in terms of thoroughly relational, interactive, dynamically engaged, word-relating activity – activity that does not involve any kind of information processing or manipulation of representational contents" (Hutto and Myin, 2017, p. 56). Needless to say, how all these processes unfold and furthermore yield paradigmatically intelligent behavior is a highly complex matter, involving not only biological but also social and cultural aspects that depend on an interdisciplinary effort to be worked out, as I discuss along the way.

Section 1 starts by providing a brief overview of the diverse origins of enactive approaches to cognition. Section 2 focuses more specifically on Hutto and Myin's REC tenets,

thus setting the stage for enactivist criticisms of mainstream approaches in Cognitive Science (which are then discussed in chapters 3 and 4). Enactivist views, especially in its more radical variants as REC, can be considered to be somewhat counterintuitive. That, though, is, in my assessment, at least in part due to the permanence and resilience of cherished assumptions that have underwritten and shaped philosophical debate concerning cognition and which are denounced by radical enactive views. Oftentimes, Enactivism is characterized in opposition to the more traditional frameworks in cognitive science. Even though that can be helpful, because Enactivism is still far from orthodoxy and, hence, an unfamiliar account for most readers, the aim of this chapter is to prime the reader to enactivist concerns and assumptions which will be decisive later on for the prospect of developing an adequate naturalistic explanation of cognition. So, I have tried, in this chapter, to place the emphasis on Enactivism itself.

1.1 A brief history of enactivism

Enactivism, as previously indicated, draws inspiration from a variety of philosophical traditions and scientific research programs. Some of the inspirations are Ecological Psychology (Gibson, 1979), Dynamical Systems Theory (van Gelder, 1998; Beer, 2000) and Robotics (Brooks, 1991). Chemero (2015) also includes Situation Semantics (Barwise and Perry 1981, 1983). Still – many – others (Ward, Silverman and Villalobos, 2017; Di Paolo, Cuffari and de Jaegher, 2018, to name a few) acknowledge the importance of philosophers from the phenomenological tradition (such as Heidegger and Merleau-Ponty).[3] Enactivism's most influential articulation is due to Varela, Thompson and Rosch (1991), who have also suggested (in a less known part of the book) how Buddhism can be a valuable resource for an adequate understanding of the mind. This section briefly presents all those elements in order to provide a general framework for enactivism.

To refer to any theory which takes intelligence as "the production, transformation and manipulation of inner states that [represent] properties of the domain that the cognizer

3 Varela et al. (1991) also cite Gadamer's hermeneutics as acknowledging the embodied nature of meaning interpretation, that is, as inseparable from body, language and social history. Pragmatist philosophers William James and John Dewey, who have introduced "space and action as constitutive elements of cognition", are one of the earliest articulations of enactivist concerns (Heras-Escribano, 2019, p. 5). Other influences include the later work of Wittgenstein and Piaget's Genetic Epistemology. As we can see, the influences are wide and varied.

was trying to deal with" (Ward et al., 2017, p. 365), that is, which assumes computationalism and representationalism, it is useful to use the label Cognitivism. Cognitivism assumes a mechanistic conception of mind. This is one of the main points of departure of enactivism from the orthodoxy, insofar as enactivism conceives of cognition fundamentally as a dynamic activity encompassing the body and the environment. Enactivism, as well as the approaches that inspired it, are reactions to mechanistic accounts of mind. A mechanistic system takes as basic the component parts and their relations in order to describe the phenomena at stake. In the cognitivist approach, the fundamental components are semantically contentful representational states, discrete internal states with informational content that represent the world and which are processed by the brain. Computationalism and representationalism often accompany each other: representationalism confers with semantic content upon the discrete units on which the computational rule-governed manipulations operate. Furthermore, contemporary views assume that all relevant cognitive processes happens in the brain. The general aim of Cognitive Science is to understand how the brain constructs a three-dimensional model of the distal environment, to which the organism has a conscious access, from the two-dimensional proximal inputs that are registered by the sensory organs. So, in cognitivist views, a science of cognition begins

> with a description of the information available on the retina and proceeds to detail the algorithm that derives from this information a representation of shape, color or kind. The algorithm will 'fill in' whatever the sparse inputs leave out, relying on rule generalizations to compensate for the poverty of stimuli. These processing stages, from which the final visual experience emerges, takes place in the brain (Shapiro, 2011, p. 164).

An ideal account of cognition would then feature a systematic association of the most basic components of reality (say, the sub-particles that constitute the atoms) with the semantic contents of mental representations, employing scientifically respectable resources only, even though in different levels of a scientific hierarchy. So, it should be possible, at least in principle, to describe states such as my desire to drink water in terms of the most basic physical processes instantiated in my brain. This project is very challenging and, from the enactivist point of view, untenable.

Gibson's Ecological Approach to Visual Perception (1986 – originally published in 1979 and following early work in the 1950's) indicates the level of Ecology (hence Ecological Approach) as the adequate level for understanding *natural vision* (and not vision as experimentally studied in laboratories). Gibson complains that the experimental methods employed by Physics, Optics, Anatomy and Physiology do not describe the facts in the relevant way needed for the task of understanding *natural* vision. Even though those sciences

can achieve stunning success, such as curing eye diseases and creating holograms (his examples), their level of operation is not adequate for understanding the complex aspects of the vision of a living being in a context. The level of description in those sciences does not take the mutual involvement of *environment* and *animal* as peculiarly important. Rather, in the experimental framework typical of experimental sciences, the animal is usually considered to be not much more than a mere component of the natural world, just like rocks or plants, though with an extreme high degree of complexity and specialization.

According to Gibson, traditional methods neglect the fact that "an environment is an ambient for a living object in a different way from the way that a set of objects is an ambient for a physical object" (Gibson, 1979, p. 8). For example, an animal does not live in space and time as conceived by Physics. In the ecological level targeted by Gibson, the categories to be observed are those of permanence and change (Gibson, 1979, p. 12). The processes observed at the ecological level can be said to have different properties than those which are observed and controlled experimentally in a laboratory (though they are not ultimately inconsistent with the latter).

The starting point of the Ecological Approach is the familiar world of living beings, which is not to be understood as the perceptible arrangement of more basic components. The basis of animal behavior is precisely the sort of phenomena which can be observed by the naked eye. What happens, from an ecological perspective, when a block of ice melts, is a process of disintegration. Nowhere in the process, as described in the level that ecological psychology targets, is to be found direct, that is, visual, evidence for the conservation of principles of matter and energy, or conservation of anything, for that matter. A visible object ceases to exist in its earlier form. So, the facts of the ecological approach are not precisely *new* and *unfamiliar.* The experimental methods often associated with science, in fact, seem to permanently attempt to *reveal* a hidden structure that is more basic and which underlies the rest (Gibson, 1979, p. 23).[4] However, the appropriate level for Psychology is not the (naturally) invisible scales of neither the cosmic nor the atomic. In fact, the theoretical notions of space and time, as employed by Physics, are actually derivative from an ecological level.

Gibson proposes then, the level of ecology to explain natural vision. Not surprisingly, Gibson takes experimental methods as being neither useless nor mistaken.

4 Another interesting remark by Gibson is that the confusion of change and permanence in the two levels (physical and ecological) might be a residue of the Ancient Greek atomic theory, according to which "what persists in the world are atoms and what changes in the world is the position of atoms, or their arrangements" (Gibson, 1979, p. 14).

Rather, the point is that, vision in normal, daily contexts, outside an experimental laboratory, is a different matter than merely registering and transforming sensory information in order to generate an image of the environment, that is, an accurate internal and virtual model of the external world. According to the Ecological approach, perception is "primarily for the guidance of action, and not for action-neutral information gathering. We perceive the environment in order to do things" (Chemero, 2015, p. 23). In other words, perception guides behavior. Perception is not the retrieval or registering of informational stimuli from the outside to the inside of an organism. Rather, perception is deeply dependent on the purposes of the animal and ultimately leads to adaptive behavior.

Perception is, then, of *affordances*, which are "directly perceivable, environmental opportunities for behavior" (Chemero, 2015, p. 23) relative to a specific organism. The concept aims to capture the organism-environment reciprocity (Heras-Escribano, 2019, p. 18). An example might help in its elucidation. Affordances are the possibilities that objects in the environment allow for the actions of specific organisms. Depending on the material properties of an object, say, its malleability or softness, stability or instability, and so on, an object, such as a tree trunk, affords different behaviors for a human, a mouse or a dog. An affordance, that is, a possibility for an organism to act, is also dependent on the bodily configuration of organisms. The emphasis is on the co-definition and co-dependence of both environment and perceiver. An interesting remark by Chemero, which was already acknowledged by Gibson, is that affordances are "ontologically peculiar". As quoted by Chemero (2015, p. 23):

> an affordance is neither an objective property nor a subjective property; or it is both if you like. An affordance cuts across the dichotomy of subjective-objective and helps us to understand its inadequacy. It is equally a fact of the environment and a fact of behavior. It is both physical and psychical, yet neither. An affordance points both ways, to the environment and to the observer. (Gibson, 1979, p. 129)

That is a familiar issue for enactive approaches. In a sense, enactivist concerns are not clearly captured by a standard ontology of properties and entities. For its emphasis on the ongoing relations between bodies and environment, it is likely that the dynamicity of cognitive activities cannot be adequately dealt with by the more static entities postulated by cognitivist approaches, such as discrete mental representations with specifiable contents. By including the ongoing interactions between body and environment, Enactivism starts to extend some of the borders of cognition.

Dynamic Systems Theory (DST) can, at least partially, avoid these difficulties because it is able to describe systems that are continually interacting and changing. Mathematical tools such as differential equations can be used to model the behavior of

nondecomposable systems and can track how the whole system evolves as it changes over time. The main assumption of a DST for cognition is that "cognitive agents are dynamical systems" (van Gelder, 1998, p. 615), as opposed to cognitive agents as digital computers. Dynamic Systems models are, arguably, closer to the psychological processes that actually take place in cognitive agents. Not only for simple actions, such as coordinately moving one's fingers, but also in the case of complex decision processes, the resulting behavior "is best thought of not as masterminded by a digital computer sending symbolic instructions at just the right time, but as an emergent property of a non-linear dynamical system self-organizing around distabilities" (van Gelder, 1998, p. 616). Instead of the linear sense-think-act/input-processing-output structures of cognitivist approaches, dynamical systems emphasize the stabilization and coordination of patterns of behavior (Beer, 2000, p. 97).

Representation, as an explanatory notion, is still compatible with Dynamical Systems Theory. Appealing to the tools of dynamical systems to treat cognition does not automatically exclude an explanatory role for representation (though the development of DSTs does force critical evaluations of traditional notions of computation and representation – Beer, 2000, p. 97). As Chemero (2015, p. 26) notes, it is not even the case that most embodied approaches in cognitive science are anti or non-representational. Most usually, what happens is a weakening of the notions of content and representation, in a sort of moderate or conservative embodied approach, as in, for example, Clark's version of Predictive Processing (2001), which posits action-oriented representations (weak notions of representations, such as in Predictive Processing, are discussed in chapter 2).

Nevertheless, one main concern of more radical versions of enactivism, such as REC, is not that of weakening representations (by making them more embodied or treating them as possessing bodily contents), but actually doing away with them. In terms of explanatory force, it is possible to argue that representations are not necessary. One of the reasons is that the creation of representations by an organism demands what can be seen, from a biological point of view, as a superfluous waste of energy. If the world is right there, it would be redundant for a cognitive system to create a virtual model of its surroundings. As the roboticist Brooks famously put, "the world is its own model" (Brooks, 1991). If it is possible for creatures to directly access their environments quickly and reliably, why would there be any need to reconstruct it internally – running the additional and dangerous risk of getting it wrong, after all. Brooks developed and implemented a non-representational model in robots that performed motor and behavioral tasks, such as collecting empty soda cans in the

laboratory, very successfully.[5] To understand the flexibility of the many activities living beings perform outstandingly better than the most sophisticated machines, such as motor behavior, it is not necessary to employ representations.

Brooks implemented in those robots the idea that organisms have evolved in environments and developed cognitive capacities whose functions were probably (at least initially or primarily) unlikely to be that of accurately representing an external world. The sources of true intelligence are capacities such as "mobility, acute vision and the availability to carry out survival related tasks in a dynamic environment" evolved throughout millions of years (Brooks, 1991, p. 140). In Brooks's view, representation "is the wrong unit of abstraction in building the bulkiest parts of intelligent systems" and, in fact, "explicit representations and models of the world simply get in the way" in the understanding of simple intelligence (Brooks, 1991, p. 139).

Brooks applied in practice some of the elements Dreyfus (1972) had long been arguing for, based in the phenomenological tradition (using Heidegger's and Merleau-Ponty's work).[6] Dreyfus argued that employing the combination of representationalism, conceptualism, formalism and logical atomism in AI laboratories was not going to solve fundamental problems already anticipated by phenomenology: how to represent significance and relevance, what is known as the Frame Problem.

The Frame Problem is a technical issue in the field of Artificial Intelligence (AI), whose more general epistemological implications were brought up by Dennett (1984), and can be characterized as the problem of representing common sense knowledge in formal models. The challenge is that of "representing the effects of an action in logic without having to represent explicitly a large number of intuitively obvious non-effects" (Shanahan, 2016). Machines built in terms of "explicitly stored, sentence-like representation of the world" (Shanahan, 2016), that is, according to cognitivist tenets, invariably face the Frame Problem.[7] Note that the problem does not concern the computer capacity of storing and encoding an enormous amount of facts or information but, rather, the problem of the computer being able

5 Trivia: the Roomba vacuum cleaners were a development of Brooks's robots.

6 The opening of Dreyfus's paper (2008) tells the story of AI developers coming to his course on Heidegger claiming to be on the verge of succeeding where philosophers had failed, namely, in understanding intelligence. Dreyfus replies that, instead of dismissing philosophy of its importance, researchers were, in fact, turning the rationalist philosophical ideas of Hobbes, Descartes, Leibniz, Kant, Frege and early Wittgenstein into a research program without even realizing it.

7 More specifically, *Classical* Cognitivism, in opposition to *Connectionist* Cognitivism. Shanahan (2016) argues that the frame problem arises for connectionism as well. Chapter 2 discusses the differences (and similarities, which make them both instances of cognitivism) between the two approaches. For the moment it suffices to say that Classical Cognitivism posits local and discrete units of representations, whereas connectionist representations can be distributed in a network.

to determine which are the relevant implications that hold between states and actions. A very simple action, like making a snack, requires the instantiation of an overwhelming amount of representations and rules. Even the most basic facts concerning that action need to be explicitly stated. More specifically, it is necessary to explicitly state not only all the relevant relations, but also the irrelevant relations: that the opening of the kitchen door does not affect the light switch nor the door of the cabinet; that when one holds a knife with the left hand, she is not holding a glass with the left hand, that when the juice is in the glass it is no longer inside the bottle and also that all the other glasses in the kitchen are not filled with juice and that the other bottles in the refrigerator remain with the same quantity of juice in them. It seems that to be able to perform such a simple action, it is necessary to know beforehand a significant amount of things and how they relate to each other. A cognitivist account of mind, in which the world is taken as a set of neutral, discrete and semantically neutral facts represented in atomistic states which can be algorithmically manipulated, faces the exact same problem of the robot.

According to the phenomenological tradition, the frame problem does not arise for human beings, because we are not at all like robots or machines. The solution sketched above, of making an exhaustive list of facts and rules, has absolutely nothing to do with the actual processes that happen in humans: "our sense of relevance [is] holistic and require[s] involvement in ongoing activity" (Dreyfus, 1992, p. xi). Dreyfus' (1972, 2008) application of lessons from existential phenomenology to the context of AI confirmed the limits predicted for empiricist and rationalist psychological accounts and the limits of computational modeling for minds. Heidegger and Merleau-Ponty were among the early pessimists concerning a mechanical account for cognition.

Heidegger's (1962) well known distinction between *Zuhandenheit* and *Vorhandenheit* can be understood, respectively, as two sorts of possible attitudes or modes of access towards the world. *Zuhandenheit*, readiness-to-hand or availability, concerns the ordinary involvement with the world in daily contexts. When in this mode, the subject is not deliberately reflecting on things and their properties. Rather, things are used *for* projects, that is, for pragmatically acting upon the world. The subject is not detached from its contextual setting. Interestingly similar to Gibson's affordances, things are for doing something: there are things, say, chairs, that are *for* sitting; pens that are *for* writing, and so on. The world accessed by the readiness-to-hand mode is not a world of objects and properties. In a sense developed by Noë (2012, p. 8-ff), the world and its objects are not really present but, rather, invisible. Only when an ordinary situation is somehow disrupted, the subject is capable of actually

seeing the object itself. For example, when the chair breaks, the attention of the subject then turns from its usefulness and availability to its properties, such as its heaviness. As a result of the disruption, the things themselves – and the world – appear, so to speak. Only then, the more abstract aspects of an object can be taken into deliberate thinking, in the *Vorhandenheit* mode, that is, the present-at-hand mode. The latter can be characterized, roughly, as the origin of a scientific, more disinterested mode of relating to the world. The most basic, and frequent, attitude in (human) experience, and which originates other modes of access to the world, is the former, involved and engaged readiness-to-hand. For Heidegger, then, it is fundamental to acknowledge that a "thinker's capacity to explicitly represent elements of her environment (as in a propositional attitude) depends on a prior capacity to skillfully interact with the environment in ways that are already subjective to normative constraints [the *for doing something*]" (Ward et al., 2017, p. 367).

Similarly, Merleau-Ponty (1964) argues that "the capacity to stand in a meaningful cognitive relationship to the environment depends on a suite of capacities for bodily interaction, with this dependence resulting in the particular details of our embodiment making crucial contributions to the structure of thought and experience" (Ward et al., 2017, p. 367). More specifically, the relationship between body and space is a form of originary relation. Taken to be pre-cognitive and pre-reflective, this relation can be understood as a sort of motor or operative intentionality. As Merleau-Ponty puts it,

> consciousness is originarily not an "I think that," but rather an "I can" [so that…] to move one's body is to aim at the things through it, or to allow one's body to respond to their solicitation, which is exerted upon the body without any representation (Merleau-Ponty, 2012, 139-140).

Another point anticipated by Merleau-Ponty is the reconceiving of nature, instead of an independent realm in relation to the perceiver, as, in fact, a "set of relations enacted in action and perception" (Gallagher, 2018, p. 6). As Gallagher (2018) puts it, that is the fundamental idea of *enaction*, that is, the bringing forth of a world by an embodied agent. Merleau-Ponty indicates how experimental methods in science are fundamentally biased in treating "everything as though it were an object-in-general – as though it meant nothing to us and yet was predestined for our own use" (Merleau-Ponty, 1964, p. 290). He says that even though he praises the scientific enterprise, by acknowledging it as being an "admirably active, ingenious and bold way of thinking" (Merleau-Ponty, 1964, p. 290).

Also included as inspiration for enactive cognitive science, is Barwise and Perry's work on Situation Semantics.[8] According to Situation Semantics, the information available to a cognitive agent is always partial. Cognitive beings are, then, *always* "spatially located (i.e. situated) and so have only incomplete, locally available information at their disposal. Every thinker and speaker is someone, who is somewhere, and who is aware of only certain things" (Chemero, 2015, p. 24). Situation Semantics is consistent with the relational emphasis enactivism promotes, in its attempt to treat meaning without appeal to intermediary entities such as mental representations, and investigate meaning directly in the relations between cognitive beings and the information in their environments.

Finally, the work of Chilean biologists Maturana and Varela in the 1970's, on the notion of autopoiesis, is also important. Emerging from a scientific framework which lacked a deep concerning with notions such as organisms, agents or persons as a whole, "autopoiesis is the idea that a living system is one that is constantly constructing itself and by this activity making itself distinct from its environment" (Di Paolo, 2018, p. 80). The autonomy and self-organization of living beings is a fundamental basis for cognitive systems, and constitute also the basis for a biological sort of intentionality. An autopoietic system is "the minimal living organization – one that continuously produces the components that specify it, while at the same time realizing it (the system) as a concrete unity in space and time" (Varela, 1992, p. 5). According to this criterion, the most basic living systems are bacteria, because they are capable of producing "through a network of chemical processes, all the chemical components which lead to the constitution of a distinct, bounded unit" (Varela, 1992, p. 5).

All those approaches culminated in Varela, Thompson and Rosch's "The Embodied Mind" (1991), the paradigmatic articulation of enactivism, in which they expose the often tacit cognitivist presuppositions that have guided cognitive science. One of them is the *cartesian anxiety* (Varela et al., 1991, chapter 7), according to which either there is a fixed ground for knowledge or we are doomed to chaos or nihilism.[9] Interestingly, as they point out,

8 Barwise and Perry refer to Gibson themselves, taking him as providing the basis, as well as Putnam (1984), for a different perspective on meaning – by "studying the coordinated perception and action of animals, [Gibson] found much more information in the environment (and so less work to be done by the animal brain, or mind) than the traditional view of perception admitted" (Barwise and Perry, 1983, p. ix). In the emerging view, Ecological Realism, meaning is "located in the interaction of living things with their environment (Barwise and Perry, 1983, p. x). Also, they acknowledge that "the standard view of logic derived from Frege, Russell, Tarski, and work in mathematical logic is completely inappropriate for many of the uses it had been put by philosophers, linguists, computer scientists and others – full of ideas appropriate for mathematics (even there we have our doubts) but inappropriate for more ordinary uses of language" (Barwise and Perry, 1983, p. x).

9 Varela et al. (1991) find in Buddhist traditions a middle way between realism and idealism. The mind, they claim, has a *tendency to grasp*: "the grasping mind leads one to search for an absolute ground – for anything, whether inner or outer, that might by virtue of its "own-being" be the support and foundation for everything else. Then faced with its inability to find any such ultimate ground, the grasping mind recoils and clings to

the opposition between mind and world, subject and object, is not a natural one, despite its recent ubiquity, but rather, has been created and then influentially promoted by many philosophical traditions.

The two extremes, one of the ideal of objective knowledge, on one side, and the inherent subjectivity of individuals, on the other, seem to find a compromise in representationalism, with the possibility of recovering (at least some of the) properties of the independent external world internally and in necessary dependence from a subject. So, cognition is neither completely objective nor subjective, but is forever oscillating between those two extremes. Representationalism, then, presupposes the existence of a pregiven world with determinate and specifiable properties, which are differently represented by different organisms. Enactivists are not interested in such a sort of moderate embodiment, where the different body configurations allow for the possibility of multiple perspectives, so to say. That different organisms, such a bat and a whale, for example, perceive different things in virtue of their different bodily configuration is a trivial claim.

For enactivists, the point is that organisms and environments are mutually specified. An interesting example concerns the perception of colors in different species. The human vision system is trichromatic, that is, humans possess three types of photo-receptors cross-connected to three color channels. Even though trichromaticism is common and spread among many species, other species are dichromatics (squirrels and rabbits), tetrachromatics (pigeons, ducks and surface fish) and may be even pentachromatics (diurnal birds). Varela et al. (1992) comment on the question: “what are the other colors that animals see?” and take it to be a naive question, though understandable. It is not the case that a tetrachromatic organism is going to be better than we are at seeing or discriminating colors, but rather, that their color perception dimension is so different from ours that they are incommensurable: “there is no way to map the distinctions available in four dimensions into the kinds of distinction available in three dimensions without remainder” (Varela et al., 1992, p. 183).

To summarize, to understand cognition is to understand “how the perceiver can guide his action in his local situation” (Varela et al., 1991, p. 173), rather than supposing cognition to be the creation of an internal virtual model of the external world. All the elements described above converge to the central enactivist concern of rejecting cognitivism’s tenets: representationalism, computationalism plus the neural assumption.[10] Indeed, those aspects can

the absence of a ground by treating everything else as illusion” (Varela et al., 1991, p. 144). The effort is to learn to let that tendency go, so that it can be appreciated that “all phenomena are free of any absolute ground” (Varela et al., 1991, p. 145).

10 I should note that obviously, the brain is part of cognitive systems, but its task is neither of representing nor performing computations on representational states. See Chapter 4 for more on the role of the brain in

be seen as intimately connected: the cognitivist position implies that it is possible to understand cognition by isolating properties of the cognitive components and mechanisms, which are mainly located in the brain. For that goal, in fact, neither the variety of body configurations and biological histories of organisms nor the dynamicity of those processes, factors that are emphasized by enactivists, make explanatory difference. Radical enactivism take brain, body and environment as all equally contributing to cognition.

1.2 Content and representation

Although nowadays awareness about the important roles that body and environment play in cognition is rapidly growing, not always have the enactivist concerns described in the earlier section been taken thoroughly. It is possible to maintain that body and environment play important roles in cognition in ways that are compatible with representationalism and computationalism (and neurocentrism). Let us see how the many available approaches can be situated in the theoretical landscape, by taking *representation* and *content* as points of reference.

For present purposes, it is helpful first to distinguish between two senses of representation.[11] Representations can be understood either as (i) the basic explanatory entity of cognitive science, defined as a physical vehicle that carries semantic contents or (ii) the result of the human cognitive capacity of taking one thing to mean, refer to or be about another. For example, a map specifies some properties which are interpreted as being about a spatial location, words represent sentences in a language and so forth. Representation as physical internal states that possesses semantic content is a basic notion in standard cognitive science. The assumption of cognitivist views is that all properly cognitive activity (as opposed to random or just reflex behavior) is necessarily dependent on the existence of representations as entities: cognition depends on "information-bearing states inside the system. Such states, by virtue of the semantic information they carry about the world, qualify as representations" (Thompson, 2007, p. 52).

One problem is that there is no agreement whatsoever on renderings of the notions of mental representations and contents, which are available in a wide variety, within different

cognition in terms of a regulator.

11 The distinction is inspired by Varela et al. (1991, chapter 7).

theories and approaches. In principle, any object that can be semantically evaluated according to a determinate condition of satisfaction is representational. That includes the "philosophy's stock in trade mentalia – thoughts, concepts, percepts, ideas, impressions, notions, rules, schemas, images, phantasms, etc – as well as the various sorts of 'subpersonal' representations postulated by cognitive science" (Pitt, 2020). Subpersonal representations are the representations which are not consciously available to the subject, such as neuronal assemblies (given that they can be semantically evaluated). What constitutes conditions of satisfaction for semantic evaluation might also vary: "consistency, truth, appropriateness and accuracy" (Pitt, 2020), among others.

On the other hand, now concerning representation as a capacity, there are definitely many activities that depend on the (capacity of) representation of aspects of the external world. Representation as a capacity of abstraction is perhaps the most emblematic cognitive behavior humans can achieve and REC does not deny that basic fact. What REC denies is that the capacity of representing (and other capacities, for that matter) can be explained in terms of manipulations of representations understood in the first sense, that is, as internal contentful representational states.

Nevertheless, the idea that contentful representations play a causal and explanatory role in cognition has been the central tenet of cognitive science. To follow Hutto and Myin's (2013) labeling, Content Involving Cognition views (CIC views), the most popular views in Cognitive Science, necessarily require the existence of contentful representations as discrete inner entities with semantic properties. Under this heading, at one extreme of the spectrum, we find unrestricted-CIC views, according to which not only highly intellectual activities (like the use of language and math) but also more low-level activities (such as activities of grasping and reaching – which humans and other animals share) are performed through the manipulation of informational contents retrieved from the world and represented in discrete inner states in the brain. Furthermore, cognition necessarily depends on contentful representations which are always neural and brain-bounded. Ultimately, the components and mechanisms which constitute cognition can be isolated and treated computationally. This view is nowadays considered to be somewhat outdated, but its influence remains.

Some researchers have conceded that there are some sorts of activities that in fact are more embodied than others. Usually what they have in mind are activities that involve motor behavior, such as grasping and reaching, and they accept that Enactivism might be true of them. So, could it be the case that enactivism is more suited to some cases but not others?

Applying Enactivism only to some sorts of "low-level" behavior (mainly motor-behavior), but not to more "high-level" cognition (thinking, planning, and so on) takes us to more moderate, restricted versions of CIC, according to which low-level behavior does not depend on representational content. But then, so this view goes on, this sort of behavior is more like a mechanical reaction and is not *properly* cognitive: "without representation there is no cognitive (as distinct from behavioral, biological, or just plain physical) science in the first place" (O'Brien and Opie, 2009, p. 54). According to this view, whatever deserves to be treated as cognition must be dependent on contentful representations.

Another conservative or compromising variety of enactivism acknowledges some of the embodied aspects of mentality, but not in a way that is necessarily incompatible with representational contents. In those accounts, representational states can spread throughout the body, being then either not necessarily brain-bound, or representative of bodily content. Nevertheless, cognition, in these views, still depends on contentful representations. Clark's (2008, 2013) action-oriented representations, for example, are "weaker" representations which "represent things in a non-neutral way, as geared to an animal's actions" (Chemero, 2015, p. 26). Even though the contents of representations are non-neutral and dependent on the bodily configuration, the representations are indeed semantically contentful.

REC, in turn, claims that not only activities that explicitly involve representational capacities, such as language use and math, are properly intelligent and cognitive. Intelligent activity can take many forms. It includes being able to speak a foreign language and doing Arithmetic, or playing chess, for sure, which seem to be more naturally dependent on explicitly representing aspects of a specific domain and applying rules to it. Nevertheless, intelligent activity also includes other behaviors, such as a young child reaching for a bottle of milk, which don't need to be obviously dependent on thinking abstractly about the world and on internally representing aspects of it (that it is a bottle of milk, that it is being held by her caretaker, that the milk's temperature is 50º C, and so on). In fact, "most animal doings take the form of sophisticated forms of highly coordinated, motivated activity that falls short of (...) the forming of explicit intentional and deliberate planning" (Hutto and Myin, 2013, p. 50). Nevertheless, those behaviors are not to be understood as merely mechanical or reflex reactions, for they arise and are performed by an engaged organism in skillful ways. Radical Enactive approaches to Cognition (REC) then, as defined by Chemero (2015), are "the scientific study of perception, cognition, and action as necessarily embodied phenomenon, using explanatory tools that do not posit mental representations" (Chemero, 2015, p. 29). A radical approach is thoroughly anti-representationalist (and, hence, non-computationalist as

well). Cognition is always interactive and dynamic, and does not involve employing representations which possess semantic contents retrieved from the external world and processed by the brain. Denying contentful representations as the basic explanatory notion for cognition, however, does not involve denying that some cognitive beings, notably humans, are able to fruitfully engage in "contentful, representational modes of thinking and reasoning" (Hutto and Myin, 2013, p. 14).

Now, one might ask: what is so problematic with mental contents and representations anyway? The problems with mental representation and contents are deep, and are not denounced only by the radicals. The project of providing a scientific, natural basis for the intentionality and phenomenality of conscious experience has not been satisfactorily fulfilled. So far, cognitive science's best bet for the naturalization of mental phenomena appealed to the notion of information. However, the notion of information itself is very problematic (Floridi, 2004) and there is considerable controversy on whether the mathematically specified notion of information adequately fits the problems in cognitive science without adaptation.

Natural information, that is, information of the sort that can be found in nature, does not immediately amount to semantic information (the sort of information that has semantic properties, such as being true or false, accurate or not and so on – and that is associated with cognitive states). The projects of developing a naturalized theory for intentional content based only on natural information have invariably failed in the face of the Hard Problem of Content (Hutto and Myin, 2013, chapter 4).

Given the fairly reasonable assumption that a naturalistic perspective is able to provide an adequate comprehension of mentality, the problem is the following: if natural content bears semantic properties, then it does not meet standard scientific constraints. Alternatively, if it conforms to standard scientific constraints, it is too weak to bear semantic properties. The most popular solution, that of augmenting it with non-semantic constraints is not entirely successful. They fail in the very determination of the semantic contents. REC recommends abandoning the notion of semantic content as the basic explanatory posit altogether. To abandon the notion of content is sometimes taken to be an impossible task from the start (for, as we have seen, the entertaining of representational contents by a mind is frequently taken to be what marks the properly cognitive realm). The Hard Problem of Content, in sum, consists in the incompatibility of positing semantic notions of content in a wholly naturalistic explanation. Before turning to the details of the failure of available strategies, I would like to explore the REC approach a little further. There has been growing

confidence that it is possible for Cognitive Science to do without the problematic notions of content and representation. Let us see how an enactive science of mind would be like.

1.3 The Radical Enactive approach to Cognition

The Radical Enactive approach to Cognition, as promoted by Hutto and Myin (2013, 2017) is an ongoing attempt to explain cognition within a naturalistic framework without positing inner representational states that carry semantic contents. REC claims that representationalism is untenable from a naturalistic perspective and, at the same time, unnecessary. This section discusses two fundamental aspects of REC: its rejection of representationalism and its strong adherence to embodiment.

1.3.1 Non-representationalism

As indicated earlier, Enactivism questions the cognitivist assumptions that cognition is representational, computational and neurocentric. It is certainly the case that brain processes are part of cognition and that, at least in part, these processes involve physical information that comes from sensory organs being affected by the external world. It is indeed possible to detect the activity of neurons and to describe it in a digital model. Neurons either fire or not, depending on the character of the input. Excitatory inputs promote the generation of electrical action potential (measured in mV), and inhibitory inputs preclude it. When the electrical potential of cell membrane reaches a certain threshold (of approximately -50mV), it fires a spike which then releases the chemical compounds known as neurotransmitters (so, synapses can be understood as converting electrical signals into chemical signals, the neurotransmitters). Pioneers in the study of the brain, McCulloch and Pitts (1943), offered a functional approach, though a limited one, that models neuronal signals in terms of propositional logic (McCulloch and Pitts, 1943, p. 115).

In the absence of stronger theoretical constraints, a very weak sense of computation can be characterized in terms of input-output processes. A neuronal system

satisfies such a weak definition, but that is a trivial sense of computation (nearly every process can be described in terms of inputs and outputs). Such a definition then encompasses irrelevant processes as well (Floridi, 2004; Piccinini, 2009, Piccinini and Bahar, 2013). Philosophers of mind have widely relied on a stronger notion of computation, that of semantic computation, according to which computation requires representation. So, the existence of contentful representations has mostly been taken for granted, with the debates revolving around the origins of the semantic content of mental representations, as either externalist, that is, depending on the external context (like teleological approaches), or internalist, depending only on internal structures of the subject.

The problem is when one takes for granted the existence of mental representations with semantic contents. Radical enactivists question precisely the naturalistic legitimacy of taking for granted or of postulating semantically contentful representations. The Hard Problem of Content can be formulated in the following way: semantic content is not a *natural* entity, to be found on nature, and it has not been satisfactorily accounted for or reduced to purely physical terms (in terms of information, for example, as it is discussed in chapter 3). The hard problem of content emphasizes that there is no strictly naturalistic legitimate account for semantic mental content and representations. The REC assessment is that there is no need for cognitive science to endure with those notions; it is perfectly possible to do without them.

The enactivist claim is that there is no need for living beings to be *veridically* connected to their environment, that is, to possess a semantically contentful representation of their environment at every moment and at every cognitive capacity. The capacity of representing, of attributing satisfaction conditions to a state or of performing contentful activities, only arises when other conditions are met. These conditions include, for example, social developments, such as the existence of collective and shared practices as the scaffolding for sophisticated[12] cognitive activities; which include, paradigmatically, the use of propositional language.

Basic cognitive capacities, on the other hand, do not need to be dependent on the manipulation of representations with semantic content, or representational at all. REC provides prospects for understanding cognition in a naturalistic and enactivist framework. REC claims that in "a truly radical enactivism" (such as itself),

> it is possible to explain a creature's capacity to perceive, keep track of, and act appropriately with respect to some object or property without positing internal structures that function to represent, refer to, or stand for the object or property in

12 The attribution of sophistication to the use of language, for example, is not to be overemphasized. In REC, basic cognitive activities, as animal behavior, are considered to be quite complex. The point is that contentful activities depend on a variety of previous capacities.

> question. Our *basic* ways of responding to worldly offerings are not semantically contentful (Hutto and Myin, 2013, p. 82, emphasis added).

It is important to point out that REC is not an eliminativist or nihilist view about semantic content. In contrast with many assessments, REC is not the *really* radical claim that there is no semantic content at all (Hutto and Myin, 2017, p. 130) and that consequently there cannot be any ambition or claim towards truth in an enactivist theory (as Milkowski (2015) claims, for example). Attributing semantic content to vehicles such as sentences in natural language is indeed important. The point is that REC understands content attribution as an *achievement*. Content-involving activities are not biologically natural capacities that unfold independently of the environmental conditions in which the organism lives, its bodily configuration and its ontogenetic history. To recall the distinction of the two senses of representation made in the previous section is helpful. REC distinguishes between contentless and content-involving cognitive capacities. What is emphasized with the distinction of two sorts of cognitive activity is that there are fundamental differences between the tracking of distal stimuli and/or of registering proximal stimuli in the environment (reaching, grasping, and so on) and activities which involve satisfaction conditions (the use of language, for example).

Contentless cognition is a biologically basic activity that is shared by many distinct living beings. It corresponds to the "responding and keeping track of covariant information" (Hutto and Myin, 2017, p. xiii). It exhibits *ur-intentionality*, that is, a form of non-representational directedness to the world that is not contentful and should not be accounted in terms of satisfaction conditions whatsoever. Ur-intentionality consists in contentless directedness (Hutto and Myin, 2017, p. 51), that is, a basic relation between organisms and environment that is weaker than full-blown intentionality. Even though it is directed to the world, it is not a representational relation. The directedness to the world of many activities does not need to be put in semantic terms. In order for a frog to eat a fly, the former does not need to represent the latter either as a predator or as a moving dot, or as a nutritious entity. Many behaviors living beings exhibit are not representational in nature, even though they are not blind to the world. Another well-known example is that of the magnetotatic bacteria, who have internal magnets that guide them away from water with high concentration of oxygen (which is toxic for them) by aligning themselves with the magnetic poles of the earth. The claim that such simple organisms are able of semantic representations has been disputed. I will come back to this point; for the moment, let us take these cases as possible examples of contentless cognitive activity: even though they are not representational they can be directed to the world.

Content-involving cognition, in turn, exhibits full-blown semantic properties usually associated with intentionality, that is, truth and reference. A paradigmatic example consists in linguistic judgments (but not exclusively). A mature human being, different from the frog or the bacteria, is able to fully conceptualize, for example, the varied nutritional habits of various species, including its own. Importantly, it is to be understood as a rather sophisticated, or later-arriving process both in ontogenetic and phylogenetic development.

According to REC, then, if there is nothing in the world that pre-theoretically corresponds to semantic content that is retrieved or registered by the sensory organs and informs a mental representation, the basic explanatory resources of cognitive science are undermined. The ultimate aim of a science of mind would be to unequivocally determine the relations between physical brain states and intentional states. If, however, there is no content to be "carried out" from one level to the other, that project is significantly weakened. The transformation of contentless basic activities to content-involving activities happens "through a process of sociocultural scaffolding" (Hutto and Myin, 2017, p. 128). In a sense, content-involving cognition is not an individual achievement, for it depends on the engagement with previously established practices. Content-involving forms of cognitive abilities are in fact contentful, but they depend on both an ontogenetic (at the level of the individual) and on a phylogenetic (at the level of the species' evolutionary history) prior development of basic cognition as well as engagement with public and shared normative practices. REC does not aim to completely eliminate semantic content "all the way up", but to emphasize that the postulation of its existence as a basic natural explanatory resource is not an appropriate strategy to describe cognition – basic or not.

1.3.2 Embodiment

REC endorses upon two important theses about cognition:

> (1) The embodiment thesis: to equate "basic cognition with concrete spatio-temporally extended patterns of dynamic interaction between organisms and their environments. (…)" (Hutto and Myin, 2013, p. 6);
>
> (2) The developmental-explanatory thesis: that "mentality-constituting interactions are grounded in, shaped by, and explained by nothing more, or other, than the history of an organism's previous interactions." (Hutto and Myin, 2013, p. 6).

On the REC approach, the sensorimotor interactions in which the body engages are activities embedded in a context, which unfold "across time and which essentially involves individuals engaging with aspects of their environments" (Hutto and Myin, 2013, p. 6). Those aspects are not pregiven or static properties of the world in any sense. All and any aspects with which an organism engages are dependent both on its bodily configuration and on its phylogenetic and ontogenetic history. The processes which constitute organismic activities are dynamic and non-linear, they continually feed on each other. Together, those processes amount to cognition. The dynamical aspects apply not only to basic, contentless cognition but also to contentful cognition: even "for organisms capable of learning, it is this [the variety of dynamic interaction patterns between organisms and their environments], and nothing else, that determines which aspects of their worlds are significant to them." (Hutto and Myin, 2013, p. 8).[13] Cognition, basic or not, then, unfolds throughout the "prolonged history of interactive encounters [which] is the basis of creatures' current embodied tendencies, know-how, and skills" (Hutto and Myin, 2013, p. 9). Thesis (1), then, states the fully embodied aspect of cognition, and its dependence on the concrete patterns that are produced and unfold temporally and spatially in the interaction of the organism with its environment. Thesis (2) states that the development of those processes depends on their history of interaction, which include not only phylogenetic and ontogenetic aspects, but also a contextual and social dimension, and nothing else.

The fundamental *enactive* and *naturalistic* lesson to be learned is that there is nothing over and above those interactions: no distinctive mental objects or structures, such as mental contents and representations which can be accessed and processed by brains after retrieval or extraction from the environment. There is also no sort of pregiven raw object or property that is retrieved or extracted from the world. All of the features which organisms attune to depend on their bodily configurations and their biological history of interactions in their environmental niches (which as we have seen might encompass social and cultural aspects). Again, that concerns not only basic cognition, such as basic perceptual activities that non-human animals or humans in an early stage of development are able to perform, but the distinctive content-involving capacities characteristic of mature humans in a social context too. Thus, REC does not deny "the existence and importance of contentful and representationally based modes of thinking; it is just that these should be regarded as

13 Social and collective aspects probably confer to contentful cognition a more stable character than it is possible for basic cognition. The stability is provided by normative constraints that are put in practice in those shared contexts.

emerging late in phylogeny and ontogeny, being dependent on immersion in special sorts of shared practices" (Hutto and Myin, 2013, p. 12).

However, and that can indeed cause confusion, or uneasiness perhaps, REC does place content-involving cognition, that is, cognitive capacities that can be regarded as semantically contentful, on a different scale than usual. Semantic content, as a natural objective entity, does not exist so it cannot be used as a criterion to distinguish what is "mindless, mechanical, dispositional, and behavioral and what is properly mental, representational, intentional and phenomenal" (Hutto and Myin, 2013, p. 52). It might be the case that both humans at different stages and non-human animals of different sorts share capacities in different degrees. In particular, the existence of contentful cognitive abilities does not necessarily depend on language nor even a very well-developed capacity of conceptualization.[14] What is important, however, is that there are some conditions which need to be previously established for cognition to be contentful and exhibit semantic properties: "without appeal to sociocultural practices there is not enough in the natural world to account for representational content of the kind that is at issue in the debate" (Myin and Hutto, 2015, p. 69).

In sum, "to understand mentality (…) it is necessary to appreciate how living beings dynamically interact with their environments: ultimately, there is no prospect of understanding minds without reference to interactions between organisms and their environments" (Hutto and Myin, 2013, p. 4). This, the proponents of REC argue, is the (only) path to a perfectly naturalistic account for cognition (even though it requires deeply reconsidering some issues). It is worth pointing out that an enactivist view takes each organism and its particular biological and cultural history, as well as its relation to the environment, to be fundamental. All of these aspects are constitutive of the organism's cognitive capacities. Hence, it might be difficult to isolate any one of these features, since they are intertwined in intricate ways. It is not just a matter of extending our explanatory concerns to include more than just brains and minds, but to understand how embodiment and cognition are fully dependent on each other. The present section aimed at providing an overview of REC and the main tenets that should be kept in mind throughout the reading of this text so these elements can be contrasted with the more traditional approaches in Cognitive Science I cover in the next two chapters.

14 Of course, language enables the possibility of articulating such content in a propositional, fine-grained way, that is not available for basic cognition.

1.4 Varieties of naturalism

Despite all disagreements issues about mentality might give rise to, one widely shared expectation in current philosophical and scientific research is that mental phenomena are eventually going to be explained by a *naturalistic* approach. However, there is no easy agreement on what it means either for an *entity* or for an *explanation* to be *natural*.[15] Those two issues of naturalism, concerning respectively, ontological and methodological aspects, are the guides for the discussion in the next chapters. There is no unequivocal characterization of naturalism, but it is safe to say that some versions of it are more strict than others. Let us take as a starting point the position according to which "everything (e.g., the universe, organic life, and human nature) can be satisfactorily explained exclusively in terms of processes and entities amenable to the methods and laws established by the natural sciences" (Rosfort, 2013, p. 1426). It is possible to identify both ontological and methodological commitments within this characterization. The two commitments can be put as salient questions which are going to provide guidance for the discussion: *what there is* and *how to know it,* respectively, ontological and methodological issues, to which I now turn to.

Chapter 2 discusses whether the ontological status of the entities that have been postulated and employed by Cognitive Science in order to explain mentality are legitimately naturalistic. As it has been already indicated, explaining the notions of mental representation and content in terms of information, a fundamental cornerstone of Cognitive Science, is problematic from a naturalistically explanatory perspective. If, as argued, natural notions of information are not sufficient to explain the semantic properties of intentional states, then we need to start looking for other insightful venues. That is what enactivist approaches aim to do: it is not to throw away everything that has been done in cognitive science so far, but rather, to reflect upon the limits of such projects, its theoretical assumptions, and provide whatever is in need of elucidation and complementation. The strictly naturalistic resources of Physics, Chemistry and Neurology are not enough to explain intentionality (and phenomenality) but they do play an important role, even if it is not in reducing psychology to physics.

15 It is interesting to point out that there is a variety of strands that label themselves naturalistic and that can almost be considered to be incompatible (cf. Horst, 2009, p. 219). Even contemporary (property-)dualists views are supposed to be "naturalizable", like Chalmers' "Naturalistic Dualism", which is claimed to be "entirely compatible with a contemporary scientific worldview" (Chalmers, 1996, p. 128).

Chapter 3, then, discusses the methodological issues concerning the limits of explanation in philosophy and science. I argue that it is fundamental to adjust both the explanatory demands as well as the expectations of scientific enterprises. In a sense to be then discussed, the demands and associated expectations for a science of mind are too requiring and stem from an unrealistic and retrograde philosophical conception of science, which assumes that it is possible to develop or achieve a complete physical reduction for mental states. The achievement of this aim would also establish a, so to say, view of nowhere. That is deeply misleading: in an approach such as enactivism, there is no such neutral and objective view. In fact, the attempt of developing a view of nowhere is itself a view from somewhere, a very specific place that aims to devoid the dynamicity and complexity of life.[16]

Even so, it should be obvious that acknowledging the limitations of the scientific enterprise does not undermine its cognitive significance and it does not necessarily entail in relativistic views of science. I do not at all intend to deny the importance of science, and I think that it is not only reasonable but also desirable for a theory of mind to conform to scientific research. The point to be emphasized is just that there are limitations on the usual methods and results that cognitive science can achieve, especially when it comes to understanding experience, whose peculiarity needs to be taken into account. Chapter 3 discusses how, even though its methodological constraints make scientific research a very successful enterprise, maybe as successful as we can get, a scientific explanation, however, does not provide us the ultimate, objective and neutral structure of reality, even though it is an indispensable tool for understanding ourselves and the world around.

After discussing ontological and methodological naturalism, I identify strict views of naturalism (associated with reductionism) to be responsible of generating what is known as the hard problem of consciousness, according to which even if a complete scientific description of reality is achieved, it would still remain unexplained the fact that some of the physical processes (supposedly, those that happen in the brain) feel like something for their subjects. This problem has permanently haunted materialistic accounts and there is no satisfactory answer to it. In a sense, the hard problem is not only hard, but actually impossible to solve. My ultimate task is to explore what I take to be two under-appreciated assumptions that, in my view, generate the hard problem. First, a complete science, as employed by antimaterialist arguments, is not going to be achieved. Even if those arguments state a

16 To avoid a more polemical interpretation of this point than I intend to, it should be clear that the issues are "*not* about the accomplishments, laudability or moral fiber of the sciences or the scientists, but of the right metatheoretical characterization to give to explanation within scientific disciplines, and explanations that span the boundaries of two or more disciplines" (Horst, 2007, p. 60, author's emphasis).

complete science as a mere possibility, its assumption implicitly relies on a strong epistemic role for scientific reduction, which was previously argued as unrealistic. Second, the distorted way in which mental phenomena are traditionally characterized beforehand excludes them from the possibility of being amenable to explanation from the very start. Typical formulations of the hard problem, for example, have claimed that the phenomenal is precisely what is left off a physicalist explanation. Put that way, the possibility of obtaining an explanation seems to be prevented from the very beginning. Furthermore, the traditional formulations fatally distort the understanding of experience and prevents us from recognizing and appreciating our place in the natural world.

2. ONTOLOGICAL NATURALISM

For dealing with the cases under study here, namely intentionality and phenomenality, a very popular venue is to take our folk psychology at face value. Folk psychology, that is, the usual and daily practices of understanding and interpreting both one and others' behavior in terms of propositional attitudes, take intentional realism for granted. Intentional realism is the thesis that behavior can be interpreted by ascribing to agents a variety of attitudes which are related to specifiable propositional contents. States such as beliefs, desires, intentions, expectations, preferences, hopes and fears are some of the possible attitudes one might have concerning a specific content (the proposition "the cat is on the mat", for example). One can then believe or expect (different propositional attitudes) that the cat is on the mat or that the rat is on the mat (different propositional content). Those are intentional states, for they are about or refer to something, that is, the mental state is about a cat (or a rat) being on a mat. However, similarly to the problem that will arise for phenomenality (as discussed in chapters 3 and 4), the intentionality of mental states, that is, their directedness or aboutness towards something else, is a vexed issue, especially if we assume a strict naturalist and materialist position to include mental phenomena. Among the many difficult issues involving intentionality, one peculiar and important feature of intentional states that generates a conflict is that there might not be a correspondent of the intentional content in the world. So, one can both believe that there is a cat on the mat (when there actually is none) as well as one can believe that there is a unicorn on the mat (when there is definitely none). This is one of the most striking features of intentionality: how can a mental representation be about something that does not exist? For Brentano (1874), for example, the explanation lies in claiming that the mind's directedness, that is, its being about something, is an exclusively mental phenomena. In fact, it serves as a mark of the mental: all and only mental states are intentional. But, at the same time, intentional states have (or at least seem to have) causal

powers. One believes there is a glass of water in the table in front of her, and desires to end her thirst, so she moves towards the table to grasp the glass. The effort of materialistically-oriented philosophers, then, has been to integrate intentional categories into a natural, scientific framework. The fundamental question concerns the relation between the intentional states of folk psychology and physical states. The most popular views assume that there is some sort of natural (physical or biological) property or relation that provides semantic content to internal states. In these views, the folk psychological concepts of belief, desire, hope and so on are seen to be "picking out, in a rough and imperfect way, both the kinds of inner states and the kinds of semantic properties that would figure in the more detailed naturalistic theory" (Godfrey-Smith, 2004, p. 147). The project was to vindicate folk psychology within neurocognitive research. Indeed, naturalization projects attempted to establish a reductive relation from semantic properties to more basic physical properties. The notion of *representational information* would then function as a bridge between the two properties.

So, it is usually assumed that there is an isomorphism between psychological states, which can be individuated in terms of propositional attitudes and their associated intentional contents, and the representations posited in cognitive science. As Ramsey puts it, representations are understood "as the scientific analogues for beliefs, desires, ideas, thoughts, and similar (…) posits of folk psychology" (Ramsey, 2007, p. 38). Representationalism is, then, the view that our cognitive activities are carried out by representing aspects of the world in some particular way, say, that there is a gray cat on the blue mat. In this sense, cognitive activities in general, share a propositional structure similar of that of language: they involve representations that have contents which have conditions of satisfaction. The general features of the cognitive science enterprise are summarized by Fodor (1987), according to whom any psychology which postulates the existence of states (entities, events, and so on) that "(i) are semantically evaluable, (ii) have causal powers and (iii) serve themselves for true (in most cases) generalizations" (Fodor, 1987, p. 10) is a folk psychology, that is, it is committed to the usual, common sense psychology used daily.

Condition (i) states that (at least some) mental states are semantically evaluable in virtue of a specific relation to the world, which fixes their content. They can then be evaluated in terms of conditions of satisfaction: "what makes a belief true (or false) is something about its relation to the non-psychological world" (Fodor, 1987, p. 11). Content and semantic evaluability are intimately interconnected: "if you know what the content of a belief is, then

you know what it is about the world that determines the semantic evaluation of the belief" (Fodor, 1987, p. 11).

Condition (ii) concerns the possible sorts of mental causation. Fodor distinguishes three of which: "the causation of behavior by mental states; the causation of mental states by impinging 'environmental events (by 'proximal stimulation', as psychologists sometimes say); and (...) the causation of mental states by one another" (Fodor, 1987, p. 12). Here, the crucial (and problematic) issue is to understand how the environmental information registered by sensory organs turns into the intentional states that are consciously available for the subject and then, constitute a causally efficacious chain that ultimately cause behavior. That relation, in the received view, is a causal relation and is generally spelled out in an informational-theoretic fashion, according to which sensory organs register the incoming information and start the serial transformations and processes that constitute the cognitive life of the individual and eventually cause behavior. Informational-theoretical approaches are assumed to be the best bet for a thoroughly materialistic theory.

Finally, the third condition assumes that cognitive processes involving propositional attitudes and its contents allow for successful generalizations and predictions concerning behavior. Intentional Realism seems in fact to be a very successful folk psychology: it works remarkably well for understanding the usual behavior of (human) agents and constitutes the usual and commonsensical way humans make sense of their own and others' behavior. Though there are also many reasons to doubt its overall success, as it is discussed in what follows, intentional realism does provide a useful framework. As Fodor remarks, "*we have no reason to doubt – indeed, we have substantial reason to believe – that it is possible to have a scientific psychology that vindicates common sense belief/desire explanation*" (Fodor, 1987, p. 16, author's emphasis). What is needed is an account that explains folk psychology, and his bet is on what he thinks is a "quite probably approximately true" scientific account: Representational Theory of Mind (plus Computational Theory of Mind) (Fodor, 1987, p. 16). Both in a mechanistic way, whereas the Computational Theory accounts for at least part of mentality where operations on mental states constitute rational processes, Representational Theory accounts for the nature of those mental states.

In what follows, I discuss how intentional realism, spelled out in terms of informational representations, not only remains influential but is in fact a background assumption in Cognitive Science. It has not exactly been challenged by the standard frameworks, though its has been adapted and transformed in order to accommodate scientific and technological developments. It turns out that the notion of representation has been so

deflated that it is not clear whether it retains its explanatory value. Godfrey-Smith's (2004, 2006) assessment about this issue is interesting. He says: "in the 1980's the problem of giving a naturalistic theory of mental content (…) looked like a philosophical problem that was both fundamental and solvable" (Godfrey-Smith, 2004, p. 147). It seemed to be just a matter of time until someone would present a framework for connecting psychological and physical (brain) states. However, it might be the case that the naturalization project of intentional content has failed to the point that it is possible "that we have been looking for the wrong kind of theory, in some big sense" (Godfrey-Smith, 2006, p. 42).

At the same time that understanding mind and cognition depends on an understanding of what goes on inside a body (and, obviously, a brain), it is important not to overlook the peculiarities of human interpretative practices. Just as a brief and initial statement, the (enactive inspired) view developed in this thesis is that the naturalistic accounts for content are significantly problematic due to their commitment to cognitivism, that is, the presupposition that explaining cognition amounts to identifying inner states with determinate semantic contents and its physical underlying parts – in terms of the information represented in brain states. I wish to argue, in due time (chapters 3 and 4), following enactivist considerations, that even though propositional attitudes and contents belong to the realm of human interpretative practices, that does not make them less naturalistic than brain states. Furthermore, the failure of naturalization projects is also due to the assumption that only the strictly deflationary resources of the so-called hard sciences could provide a satisfactory explanation of intentionality and phenomenality and to assume that everything else is out of the natural domain. Which brings us to considering methodological issues concerning naturalism and mind (which are discussed in the next chapter).

The project of naturalizing intentionality was then, the first, fundamental step towards naturalizing the mind, since intentionality is one of the marks of the mental, alongside with phenomenality. Phenomenality, notoriously dubbed "the hard problem of consciousness", could wait for the developments that naturalizing intentionality could bring. The aim was to achieve a naturalistic explanation of how internal states come to have their meanings, that is, how mental states are semantically intentional or have intentional content. And supposedly, from that basis, it could be extended or modified into phenomenal content. Intentionality is acknowledged as a real phenomenon, so the attempts do not aim (in general) to deny it, but to account for it in ways that are legitimately naturalistic. The project of naturalizing intentionality thus tries to reconcile intentionality with physicalism, that is, the idea that all natural things are reductively explainable by strict scientific resources. For the

most part, such reductive attempts have identified *representational information* as the key building block in a naturalized account of intentionality. Representation seemed to be the best bet as the connection between mind and world, especially with the aid of the notion of information, which has played a fundamental role in cognitive science. However, both the notions of representation and information are deeply problematic. More specifically, any notion of representation that relies only on deflationary resources from the natural sciences, such as natural information, fails to satisfactorily explain intentionality. This fact is uncontentious: there have been many attempts to fix the notion of representation. Teleosemantics, for example, is one such attempt: Dretske (1980, 1981) and Millikan (1984) proposed to take the evolutionary history of the organisms into account in order to explain the contents of representations in natural terms. Fodor's Asymmetric Dependence (1987) is another way to specify the relevant causes of a mental content from collateral ones. Nowadays, one currently popular strategy in the attempt to fix the notion of representation is to weaken it. Recent developments in Cognitive Science, such as the Predictive Coding (or Processing) framework, employ a deflationary notion of representation, according to which inner states represent in a less neutral or objective way (see section 2.3). Another way to dispel the problems with representations is by claiming that they have a more modest, explanatory, instrumental or heuristic role in cognitive science, instead of a causal role in virtue of their content. That is not a very satisfactory strategy, because this sort of representations loses the advantage of them having a causal role in cognition: since they are just useful posits, they cannot cause anything. Given the failure of providing the expected thorough naturalization, it might seem that current projects are significantly limited in relation to the original project of establishing the relations between physical and intentional states. However, anti-representationalism, in its turn, has never been considered to be a viable option. The radical enactivist approach aims precisely to develop the consequences of questioning the assumption that the primary work of cognition is to mentally represent (Hutto and Myin, 2018, p. 198). Instead of fixing or weakening the notion of representation as a basic explanatory posit, REC proposes to simply abandon it. Let us see first how things have developed according to the representationalist assumption.

2.1. Representation and information

Strictly speaking, explaining representation is difficult even for ordinary physical items such as photographs, maps, diagrams, road signs and words, for example. It is not clear what constitute sufficient criteria for a non-mental sort of representation. It has been argued that those sorts of objects exhibit *derived intentionality*, that is, they get their representational powers from attributions performed by a cognitive agent, most likely a human being. Thoughts (or other cognitive capacities), on the other hand, are provided with an *original* (or *intrinsic*) *intentionality*. Peirce (1940) provided one influential way of spelling out non-mental representations, which has also shaped current cognitive science (see Ramsey, 2007, p. 22). In Peirce's Semiotics, signs can represent in three ways: by resemblance (icons), causal or law-like means (indexes) and by convention (symbols). The question then is to explain how cognition and its representational states can exhibit original intentionality by means of one of those representation models. All those models have been employed in Cognitive Science (see section 2.3). Nowadays, the naturalistically inspired approaches exploit relations between physical states, especially those where icons and indices participate (for their mode of representation is dependent on the physical aspects of the target objects – whereas a conventional relation is not). The idea is to provide a scientifically legitimate explanation for intentionality in terms of the natural information that iconic or indicative relations express.

Unfortunately, Peirce's considerations cannot be taken literally in the case of cognition, because they presuppose an interpretant that is not available within cognitive systems: "representation is always a triadic relation, involving (a) the sign, (b) its object, and (c) some cognitive state of an interpreter (the "interpretant")" (Ramsey, 2007, p. 22, 2016, p. 2). If one of those relata is missing, then there is no representation. It can't be presupposed that there is some sort of homunculus in the brain that interprets the information provided in iconic or indicative relations. So, it might be the case that Peirce's distinctions are a better fit for items such as ordinary physical objects, for the presence of an interpretant in those cases is less problematic. For example, the number of rings in a tree trunk does not itself mean anything but, in the presence of representation-consuming beings, such as cognitively mature humans, it represents the age of the tree.

The application of a representation-based natural model based in information to *mental* states in *cognitive* systems quickly runs into difficulties. A theory of mental representation involves explaining, on one hand, how a mental representation gets its specific content. On the other hand, it involves explaining the role the mental representation performs in the cognitive system specifically in virtue of its content. In simpler terms, the problems

concern what makes a representation have the content it has and what makes it perform a representational role in the first place. This twofold issue is often referred to in the literature as the *job-description challenge*, whose formulation is due to Ramsey (2007). In what follows I am mainly concerned with the first question, that is, how an inner state gets its representational content.

The naturalization project consists in explaining semantic properties of propositional attitudes and intentional contents without resorting to semantic or intentional properties, so the resulting explanation is not circular. The notion of information has been one important venue for answering the challenge. However, information is as pervasive as it is ambiguous. It has been massively used in recent developments within different fields, both within and outside philosophy, and it is very unlikely that a unique characterization fits all of those uses. It is important to proceed with caution in order to avoid conflating the many ways in which the notion of information can be characterized. It is clear, though, that the well-defined mathematical characterization of information as a measure for uncertainty in terms of probability (Shannon, 1949) falls short of what is required in Cognitive Science to explain cognition: "information and mathematical properties of informational amounts and their transmission [are] not the same thing as semantic content or meaning" (Adams, 2003, p. 498). It is fundamental to make sure that the notion of information being employed does not presuppose or carry with it any sort of semantic property, something which has proved to be far from an easy task. The Hard Problem of Content, as emphasized by Hutto and Myin (2013), consists in making explicit the fact that the available notions of representation, in terms of informational relations, are either too weak to constitute semantic content or they are too strong to be strictly naturalistic.

Only after the recent growing influence of Enactivism, the possibility of a non-representational account of cognition has been taken more seriously, but the major theoretical frameworks remain fully committed to representationalism. Despite their well-known problems (section 2.4), representation and information continue to be fundamental for Cognitive Science, being employed by virtually every available approach. The next two sections show how ubiquitous the notion of representation is in Cognitive Science. Even having fundamental differences, Classical Cognitivism, Connectionism and Predictive Processing share the representationalist tenet.

2.2. Representationalism in Cognitive Science

A major influence to Classical Cognitivism, Fodor's Modularity view of mind (1983, 1985) is a representational and computational approach according to which the mind is functionally divided into distinct mechanisms responsible for different tasks: the transduction mechanisms, the input systems (or modules) and the central processing system. The function of these mechanisms is to, respectively, register proximal stimuli, that is, the information that affects the sensory organs of an organism; to create a distal representation, that is, how things are in the world based on the previously transduced information, where modules process the initial sensory information so "as to make it accessible to thought" (Fodor, 1983, p. 40). Finally, the central system uses these representations to perform activities such as the guiding of behavior, thought, imagination and decision processes. A simple action, like grabbing the cup of coffee on my desk, depends on the creation of a representational model of the location of the cup based on the sensory information that gets gradually processed by the modules and that eventually leads to the movement of my arm. In particular, the modular system is "(…) (inter alia) an informationally encapsulated computational system – an inference-making mechanism" (Fodor, 1985, p. 3) whose "inferences (...) have as their 'premises' transduced representations of proximal stimulus configurations, and as their 'conclusions' representations of the character and distribution of distal objects" (Fodor, 1983, p. 42). This description can be thought of as a general account for what is called Classical Cognitivism in Cognitive Science. Fodor's influential account relies on the assumption that mental representations and their contents can be modeled in a linguistic/syntactic structure (as the Language of Thought Hypothesis states (Fodor 1975, see also Fodor, 1987 – appendix), and so, cognitive representations are literally sentence-like.

An important feature of classical cognitivism is that a psychological account holds a certain autonomy from the neurobiological details. However, the multiple realizability argument for cognition (cf. Section 3.3) allows it to be implemented, or realized, in a variety of physical substrata, without compromising the overall picture of intentional realism. Humans (and other living beings, such as mammals) implement cognition in a neurobiological substratum, but that is not constitutive of cognition itself. Supposing that aliens and computers could be intelligent, the physical substract on which their cognition is implemented is probably different, but their cognitive systems would still be framed in terms of propositional attitudes.

The development of neural networks led to the questioning of the folk psychology (and classical cognitivism) claim about multiple realizability and the possibility of understanding cognition independently from its implementation at the neurobiological level. Furthermore, connectionists question the claim that "propositional attitudes are *functionally discrete, semantically interpretable*, states that play a *causal role* in the production of behavior" (Ramsey, Stich and Garon, 1990, p. 504). Connectionist frameworks reject the step-by-step rules and abstract linguistically structured representation-based account offered by Classical Cognitivism and argue that since cognitive phenomena are influenced by a multiplicity of external and internal events simultaneously, the serial or linear processing presupposed by modular views is not an adequate model (Rogers and McClelland, 2014, p. 1026). So, it might not be possible to identify "particular features or states of the system which lend themselves to a *straightforward* semantic evaluation." (Ramsey et al., 1990, p. 510, emphasis added). Instead of serial and localized representations, connectionists propose a parallel and distributed processing (PDP, as it is widely known) for cognitive architecture, which is often subpersonal, that is, not consciously available to the subject. In a rather sketchy description, the architecture is composed of

> simple units which, like neurons, are at a given time, activated to some degree. These units, again like neurons, are connected (these connections can be of varying strengths) to other units so that, depending on their own activations, they can act to increase (excite) or decrease (inhibit) the activations of these other units. Additionally, in some connectionist systems these connections strengths can be altered as a result of activity in the system so that the effect of one unit can change over time (Bechtel, 1987, pp. 17-18).

Despite the appeal to a putative more biologically inspired approach to cognition, influenced by neuroscience, the point at issue here is that the output of the processing is, in fact, claimed to be a *representation*. As Rogers and McClelland state,

> in the PDP framework active representations in the mind are thought to correspond to the patterns of activation generated over a set of units. For example, a percept of a visual input is assumed to be represented as a pattern of activation distributed over many neurons in several different brain areas, and each neuron is thought to participate in the representation of many different items. (Rogers and McClelland, 2014, p. 1038)

The system provides, based on the input information and prior processing rules, an interpretation of the initial informational state which will yield a (distal) representation of the state of the world (when it concerns the model as applied to cognitive systems). Cognition is then a matter of how *brains* themselves represent, without the need of abstract, symbolic and ontologically independent representations.

These approaches are considerably different (even though some think they can be integrated – Fodor and Pylyshyn (1988) claim that it is a matter of implementation, for example, whereas Ramsey, Garon and Stich (1990) disagree), for they rely on different notions of content and representation. More specifically, the formats and vehicles in terms of which those notions are spelled out are quite different: whereas classical cognitivism employs abstract symbolic representations, connectionism emphasizes the neurobiological substract. Arguably, though, they share, the fundamental representationalist presupposition: the attribution of semantic properties to the inner structures that function, in cognitive systems, as truth-functional surrogates of aspects of the world in the cognitive processing of the subject. The representations yielded in the cognitive processes are semantically contentful: they represent aspects of the world (their contents), that is, they take the world to be a certain way (for example, to be raining, to there being a cup of coffee in my desk, and so on), which constitute their satisfaction conditions (truth or other weakened conditions of satisfaction, such as accuracy or adequacy), either personally or subpersonally (that is, with or without the need for the organism to be conscious of it). The assumption that cognition can be understood in terms of the production, transformation and manipulation of inner states that represent properties of a specific domain is often referred to as the fundamental assumption in the *cognitivist* paradigm (see Ward et al., 2017, p. 365; Steiner, 2014, p. 44, Haugeland, 1981).

While Classical Cognitivism achieved impressive results in modeling and replicating paradigmatic cognitive behaviors, such as playing chess, it also met with significant obstacles, especially when it concerned the understanding of other more flexible behaviors that living beings are capable of performing. Behaviors such as pattern recognition and motor control were more successfully handled by Connectionist approaches and its suggestion that intelligent and adaptive behavior emerge from the complex activity of the neuronal units and their interconnection, instead of the production and manipulation of discrete representational states. Either way, one possible reason for the shortcomings of computational approaches in either form is the metaphor, or the model, of mind as a computational device. As Ward et al. (2017) summarize,

> from the mid-twentieth century, the cleverest objects whose workings we could understand were computers – systems that took impoverished inputs from their environment (via key-presses or other sensors), went through a complex sequence of structured inner states whose unfolding was governed by well-specified algorithms and principles, and produced some output appropriate to the task for which it had been programmed. We humans can also do some pretty clever things, and we know that a staggering complex web of internal states intervenes between our perception of the environment and our intelligent response to it. Understanding our cognitive capacities as those of particularly fancy, biologically realized, computational systems seemed (and still seems) like a good bet (Ward et al., 2017, p. 366).

However, the computer metaphor is fundamentally restricted: “ignoring the body is an obvious consequence of taking the brain to be a computer and the mind to be computer programs, making it natural to think of the body as peripherals: our sensory surfaces are analogous to keyboards; our muscles are analogous to monitors and printers” (Silberstein and Chemero, 2015, p. 188). Acknowledging those limits, and questioning the possibility of a purely mechanical account for cognition, reflected in the enactivist views that were starting to receive attention in the early 90s, as a reaction to the representation-centered theories that dominated Cognitive Science. However, the notion of representation seems to be a very difficult concept to abandon and, despite the problems it raises, is still considered to be indispensable by many. The most recent and promising approach in Cognitive Science, Predictive Processing (sometimes, Predictive Coding) framework (Friston 2010, Howhy 2013, Clark 2013, 2016), brings together brain, body and environment in the attempt to ground “a unified science of mind, brain and action” (Clark, 2013, p. 200). It does so by employing a different sort of representation, *action-oriented* representations, that is, representations that are not neutral models of external aspects, but rather, representations whose primary aim is to guide action, as it is discussed in the following section.

2.3. Representation nowadays

The basic commitment of the Predictive Processing framework is to regard the *brain* as a sort of prediction machine. That is, the brain is thought to perform probabilistic reasoning in order to produce the cognitive hypotheses that underlie perception and action. Importantly, the brain implements probabilistic reasoning accurately enough so it is able to minimize errors by calculating and predicting probabilities. The brain’s task is to “discover information about the likely causes of an impinging signal without any form of direct access to its source” (Clark, 2013. p. 183) even though the aim is not to provide a mapping relation between environmental and inner states. The brain is supposed to *infer from the inside* what are the worldly causes from the proximal informational input registered by the sensory organs.[17]

17 A main difference in the cognitive architecture of recent approaches concerns one main Predictive Processing tenet: it allows for the top-down flow of information, instead of only bottom-up (which starts from the information retrieved by sensory organs which gradually increase their complexity). The top-down flow of information (that is, the concurrence of complex cognitive reasoning) is part of what constrains the

Perception and action in this framework are deeply connected in the sense that they form a system which "reduces prediction error by sculpting and selecting sensory inputs" (Clark, 2013, p. 183). The main idea is that the brain is constantly generating probabilistic virtual hypotheses about the states of the world based on the current input and the previous information it possesses. By being oriented to action, representations and their informational contents are embodied for they are constrained by sensorimotor aspects. Also, the predictions the brain calculates about the distal causes and the constraints that action and movement forcefully puts on the incoming signals all serve for the minimizing of error and maintaining the successful functioning of the organism.

From this initial exposition, it is possible to see that the cognitivist commitment of attributing semantic properties to inner structures upon which cognition depends is a defining feature of mainstream Cognitive Science (even in its more embodied variants, according to which representations are dependent on bodily skills or vehicles) and probably still stands as the prevailing hypothesis in research about cognition. The Predictive Processing framework is explicitly assumed to be a thoroughly representational view of the mind: "the mind is essentially a thinking or representing thing" (Clark, 2008, p. 149). The resilience of the notion of representation in Cognitive Science research has led to the "representation wars" (Clark, 2015). Interestingly, peace is supposed to be "ecumenical", that is, to achieve an "understanding of internal representation that can accommodate important insights from the enactivist tradition without renouncing the theory's representational credential" (Williams, 2018, p. 142). The possibility of such an ecumenical solution is, however, denied by (radical) enactivists, because of the inherent difficulties associated with representational accounts (see next section).

In spite of the explicit commitment to the existence of representations, it is also possible to observe a tendency to deflate the notion of mental representation, from the propositional attitude model to other more dynamical and even embodied forms, as in Predictive Processing. However, if the inner states that are involved in cognition are not

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predictions the brain probabilistically calculates. What is actually carried from bottom to up is only the divergences from the expected model. Predictive Processing allows then, for the possibility of the theory-ladenness of perception, at least to a specific sense. Clark says: "what we perceive depends heavily upon the set of priors [prior beliefs that constrain the brain's workings] (…) that the brain brings to bear in its best attempt to predict the current sensory signal" (Clark, 2013, p. 187). Also, "endogenous activity and the self-selection of the sensory flow) place PP just about maximally distant from traditional, passive, "feedforward hierarchy" stories" (Clark, 2015, p. 2). The possibility of the theory-ladenness of perception (or in other terms, the Cognitive Penetrability of perception), is vehemently denied by Fodor in an interesting debate that nevertheless presupposes a computational account for cognition. Though this is a very interesting issue of fundamental importance for the rendering of the cognitive architecture, my aim in this footnote is only to emphasize the structure of input-processing-output that is present in each view.

anymore understood in a strong, objective sense, the question that arises is how actually *representational* are those more updated versions of representation? Recently, in fact, it has been argued that the answer is: not so much. This is because, according to at least one argument, the notion of representation has been adapted and loosened to the point that it is no longer clear that it continues to serve its original explanatory purpose.[18] Debates about what counts as a mental representation and how internal structures represent, if they do at all, are the basis of the ongoing "representation wars" (Clark, 2015). A significant part of the debate concerns whether recent action-oriented accounts, construing representation in a more distributed and pragmatic guise – such as PP – actually qualify as representational after all.

Clark (2015) claims that cognitive activities employ action-oriented representations which "aim to *engage* the world, rather than to depict it in some action-neutral fashion" (Clark, 2015, p. 4). The goal of cognition is not to produce a representationally accurate model of an organism-independent external world; rather, cognition intervenes in the world, transforming the content delivered via perceptual processes. More specifically, contents are constrained by aspects such as bodily form, personal history and environmental niches. Clark himself accepts that it is possible to end the representation wars and achieve peace between representationalism and enactivism (the non-representationalist side), but insisting that representations are necessary, even if they can be biologically frugal (Clark, 2015, p. 4).[19] Now, granted that there are representations, they represent something as being in some particular way. So what is the content and conditions of satisfaction of action-oriented representations? The complexity and the active and dynamical character of action-oriented representations might, in a remark that will prove important, concerning the relation between psychological and physical states, make it

> even harder (perhaps impossible) to adequately capture the contents of the cognitive roles of many key inner states and processes using the terms and vocabulary of ordinary daily speech. That vocabulary is "designed" for communication, and (perhaps) for various forms of cognitive stimulation (Clark, 2015, p. 5).

What Clark claims here is that the intentional vocabulary does not directly corresponds or reduces to the vocabulary of the brain states. That tmakes it specially difficult for there to

18 In an interesting remark that captures another Kuhnian aspect of cognitive science, Ramsey observes, concerning how concepts are employed in paradigm changes, that "despite losing […] explanatory value, [previous concepts] nevertheless retain their stature and prominence as even revolutionary thinkers resist abandoning something central to their basic understanding of the subject. The posit is perhaps transformed and re-worked as theorists contrive to fit into a new explanatory work for which it is ill-suited. Yet its appearance in the new theory is motivated not by any sort of explanatory necessity, but by a reluctance to reject familiar ontological commitments" (Ramsey, 2007, p. 1). This consideration applies for the use of the notion of "representation" in current cognitive science.

19 Clark's view is that it is possible for representational structures to vary within a representational spectrum.

exist an intertheoretical, intelligible relation between physical and psychological processes. So, the contents of action-oriented representations are difficult to capture, given its permanently ongoing aspect and organismic specificity:

> The probabilistic generative model […] is designed *to engage the world in rolling, uncertainty-modulated, cycles of perception and action.* Nonetheless, high-level states of the generative model will target large-scale, increasingly invariant patterns in space and time, corresponding to (and allowing us to keep track of) specific individuals, properties, and events despite large moment-by-moment variations in the stream of sensory stimulation. Unpacked via cascades of descending prediction, such higher level states simultaneously inform both perception and action, locking them into continuous circular causal flows. Instead of simply describing "how the world is", these models – even when considered at those "higher" more abstract levels – are geared to engaging those aspects of the world that matter to us. They are delivering a grip on *the patterns that matter* for the *interactions that matter* (Clark, 2015, p. 5, first emphasis added).

Given the foregoing, it is natural to reflect upon what it takes for an inner structure to represent, altogether. One worry is that representation cannot *just* boil down to responding to stimuli and causally influencing other states and processes (Ramsey, 2007, p. 4, for example). An inner structure, in order to be representational, has to meet the job-description challenge: (i) to refer to something as being in a certain way and then, being subject to conditions of satisfaction, and (ii) to play a causal role in the cognitive system because of its having that specific content. One of the problems is that, if the content of a representation cannot be specified, as Clark seems to imply, there is no way to account for its causal role in the cognitive system in virtue of its specific content. Next section discusses this problem as a principled objection to representational theories based in information.

The ubiquity and indiscriminate use of the notion of representation obscures the possibility that what mediates causal relations between organisms and their environments might not be of a properly representational nature, but rather a much weaker relation, which REC actually welcomes. Hutto and Myin (2017) in fact agree that Predictive Processing and Radical Enactivism are compatible, provided that the former is stripped of its commitment to a robust theory of semantic content (see Hutto and Myin, 2017, ch. 3). In any case, it is fairly obvious and undeniable, given current scientific understanding, that the processing of the sensory signals in the brain is part of an account of cognition. The problem lies in presupposing either that it would be possible to determine semantic content from said processing alone or that neural states themselves can represent. For example, Clark says that

> to naturalize intentionality, then, "all" we need do is display the mechanisms by which such ongoing (...) engagements are enabled, and make intelligible that such mechanisms can deliver the rich and varied grip upon the world that we humans enjoy. This, of course, is exactly what PP sets out to achieve (Clark, 2015, p. 2)

This implies that the less objective, action-oriented contents are manipulated until they yield or achieve the status of being intentional. However, it is still not clear how the problem of naturalization of content is solved, that is, how semantic content arises from purely physical and dynamical information processing. Even in weak renderings of the notions of content and representation, the hard problem of content for representationalist approaches "is not what kinds of properties are represented or how, for example, less than fully objectivist properties are represented, but in fact the very possibility of representation as such" (Nascimento and Myin, 2017, p. 127). For, as I discuss in the next section, spelling out semantic content in terms of purely physical information, that is, solving the Hard Problem of Content, is a doomed endeavor from the very start.

2.4 Problems

So far we have seen how committed to representation Cognitive Science is. Brains or minds are supposed to implement or produce cognition by transforming and manipulating inner states whose intentional content is responsible for causing the subject's other mental representations and overt behavior. Now, how do those representations acquire their content? If one is to provide a naturalistic answer to intentionality using the notion of representation, it will face the Hard Problem of Content. According to the proponents of HPC, either the notion of content is naturalistically legitimate (being limited to informational relations such as covariance and resemblance/structural isomorphism and, at the most, biological history and proper function of organisms) and then necessarily falls short of semantic content or it is previously contentful (even to a minimum) and then it is not acceptable from a naturalistic point of view: if something more substantial than covariance or isomorphism is smuggled within the notion of information, then it is a circular explanation, for it does not explain semantic properties, but rather, presupposes it (Hutto and Myin, 2013, p. 67). A naturalistic account is supposed to start with (and stick to) a strictly deflationary notion of information.[20]

I do not at all intend to provide definitive reasons to dismiss or to choose for either way of understanding the informational sensitive role of the inner states that constitute

20 Hutto and Myin consider a third option, but I will not focus on it. The alternative would be to posit a semantically rich notion of information as a metaphysically primitive notion. That would, however, require expansion or revision of physical principles, a task outside the scope of this research (Hutto and Myin, 2013, pp. 68-69).

cognition (whether the relation of inner states and the environment is best spelled out in covariance or isomorphic terms or in a combination of those (Ramsey, 2016) is at least in part a question whose answer depends on further empirical research). My aim is to emphasize that it might be the case that the inner states involved in cognitive activities that are usually taken as being representational are, in fact, not more than merely sensitivity to physical properties. The anti-representationalist enactivist alternative takes inner states as being informationally sensitive, but not as semantically representing. My aim in this section is to present the principled problems that prevent a thorough naturalistic account for representation based in the notion of natural information, though making the way for a non-representationalist theory of basic cognition.

There are two prominent ways according to which informational theories of representation have been recently developed, based on the Peircean distinction: mental representations acquire their contents by means of informational relations either in terms of indication/detection or resemblance/similarity. In a cluster of related shortcomings, however, informational theories in both guises (or in any guise) fail to satisfactorily solve the Hard Problem of Content. There seems to be an apparently ineliminable indeterminacy of content, which entails the impossibility of the fine-grained individuation of the intensional contents of mental representation; and for the individuation of the proper causes of representations; that is, meeting the job-description challenge, all of which can be captured by the disjunction problem (Fodor, 1987, 1990, see below). Independently of how the mental representation of information is worked out (either by indicative or iconic accounts), it is not possible to unequivocally determinate the representational content. The reason is that whereas natural information is coarse-grained, semantic content (or meaning) is fine-grained. The natural information provided either by covariance or isomorphism between states is not easily transformed into the non-natural intentional and semantic information supposed to be possessed by mental states.

That makes explicit the unviability of the reduction of mental representation and its contents to physical information only. The point is that natural informational relations are cheap: neither mere indication nor similarity provides sufficient resources for the determination of semantic content. For folk psychology to be vindicated by a representationalist cognitive science, they need to have the right sort of properties, namely, intentional and causal properties that answer to the job-description challenge.

The disjunction problem is fatal for causal-informational theories. Insofar as both iconic and indicative relations are instances of theories which exploit physical information,

they are both challenged by the disjunction problem. In Fodor's words, the disjunction problem

> arises in one or another guise for every causal theory of content that has thus far been proposed. Accordingly, there are various ideas for circumventing it in the literature in which such theories are espoused. None of these proposals has been very satisfactory, however; (…) the problem that causal theories have (…) is perhaps intrinsic and ineliminable. (Fodor, 1987, p. 102).

The disjunction problem can be described as the following (based in Fodor, 1990). According to a crude causal theory of representation, a mental representation has as its content whatever reliably has caused it. When one mentally tokens a representational item "cow", its content is whatever was caused by the properties of the external object (the cow itself). The physical story can be told in terms of the proximal stimuli (the information that hits the sensory organs, such as the amounts of light that hit the retina), which is then transformed in order to provide a distal representation of the object. In normal situations, a tokening of the mental item "cow" is supposed to have been caused by a cow. However, it is often the case that a tokening of "cow" is not caused by a cow, but rather by a horse-in-the-dark. Then, not only cows cause "cow". As defined, according to the causal theory, the mental item "cow" denotes that which reliably caused it. But if "cow" can be caused by something else than a cow, that is, not only the properties of a cow cause "cow" but also some horse properties, what "cow" denotes is not the property of being a cow, but rather the property of *being a cow or a horse-on-a-dark-night*. And then the instantiation of either one of the conditions of the disjunction makes the tokening of "cow" true. It seems that there is no way to instantiate an unveridical tokening of "cow", as Fodor puts: "there can be no thing as *misrepresentation*" (Fodor, 1987, p. 101). A tokening of "cow" can be ultimately caused by anything (at least in some sort of specific situations that lead to error), and it would not be possible to determine its meaning.

If a mental state is semantic, it is supposed to have truth conditions: it can be true or false (or accurate and so on) based on conditions of satisfaction. However, it is impossible for a state that is in an informational relation with another to carry false information. At the most, the correlation can be weak or strong, but not false. Whereas it is possible for someone to be wrong if she holds a belief that is false in virtue of its content, it is not the case that a thermostat can be wrong about the temperature in a room (if it is properly functioning). Not every two states that covary or resemble each other are mental states (thermostats register covariant states, but it is not a case of mental representation – as peculiar as enactivism might sound, it does not attribute mentality to non-living things).

The problems presented above are well-known issues that led to the augmenting of the notion of covariation with other notions. The issue that needs to be dealt with is how to correctly identify which causes are determining of content and which are secondary, or collateral to it. As naturalistic approaches, there are constraints: only natural causes and conditions are allowed. Theories that complemented the mere causal relation were developed by Dretske (1981), Millikan (1984), Fodor (1987, 1990), and include appeal to normal conditions, natural selection and asymmetries between causal relations. However, the same problems rise again: either the augmented notions are too weak to account for semantic content (even though they are part of a natural explanation), or they from the start presuppose semantic properties.

The notions of representation and content are fundamental because they provide a way of integrating the physical and intentional levels: they bridge the processes that happen in a physical basic level to the higher personal psychological levels in an intelligible way. As Gerrans states: "there *must be* an explanatory relationship between neuroscience and folk psychology" (Gerran, 2014, p. 33, emphasis added). Informational representational content is a sort of structure that makes intentional realism make sense. An intelligible relation would, inter alia, be useful for dismissing explanatory gaps between psychological and physical processes.

The structures developed in Philosophy of Language can be said to have helped in the framing of worries about intelligibility between semantical and physical states. It might have been the case that the notion of propositional content has been carried out from (some realms of) Philosophy of Language and reproduced in Philosophy of Mind and Philosophy of Perception without any sort of adaptation. The formal systematicity that linguistics offers for the semantics of (at least parts of) language is assumed to be the case for mental representations as well. In this sense, it is interesting to point out that "the origins of cognitivism [...] overlap with those of a central strand of 'analytic philosophy' - the construal of thought in terms of formal transitions between propositions, and the construal of minds as fundamentally seats of propositional attitudes" (Ward et al., 2017, p. 367).

Hutto and Myin observe that "if one focuses attention only on the kind of intentionality exhibited by beliefs and desires with articulable content it is easy to become convinced that intentionality must be, always and essentially, bound up with content" (Hutto and Myin, 2017, pp. 96-97). By adopting the propositionalist/mechanical framework, however, philosophy of mind and cognitive science have in fact inherited the same intrinsic puzzles of philosophy of language.

So, the urge to provide an account that assumes reduction to intelligibly determine and integrate physical and psychological processes is a "philosophically motivated need" (Hutto and Myin, 2017, p. 169). It is rather, generated by the assumptions that have underlined cognitive science. It is also interesting to point out that, given appropriate circumstances and explicit acknowledgment of limitations, "it is always *possible* to characterize physical systems using representational language" (Ramsey, 2007, p. 33). The point is then, not really whether it is possible to describe brain processes in representational terms (it is), but rather whether that strategy is informative about the way brains really work and whether it should be taken as the main model for explaining it.

2.5 The enactivist proposal

It has become clearer that the project of explaining intentionality by employing only standard naturalistic resources of causal relations, nomic information, evolutionary history and biological-developmental functions still falls short of explaining how the physical processes that happen in the brain could possibly exhibit semantic properties. The project of combining a mentalistic psychology with physical information has failed to the point that it is possible, as Godfrey-Smith puts, "that we have been looking for the wrong kind of theory, in some big sense. Naturalistic treatments of semantic properties have somehow lost contact with the phenomena" (Godfrey-Smith, 2006, p. 42).

The solution REC proposes is to embrace these augmented notions but, at the same time, emphasizing that it is impossible to develop a metaphysically robust account for semantic content out of them. In the REC view, then, states can carry information about each other, but only on the covariance sense, which is not sufficient to yield semantic properties, such as truth or reference. In the case of mental states, the covariance with external affairs does not *mean* anything that is subject to satisfaction conditions (Hutto and Myin, 2013, p. 67). Whatever is established in the relation of augmented covariation is not enough to possess semantic properties. REC, however, does not dismiss the importance of the role that the deflationary notions of informational covariance, developmental functions and evolutionary history, emphasized by teleosemantical and teleofunctional accounts, play in cognition.

In sum, REC accepts that "on-line sensory signals "carry information" in the co-variance sense but not that they "pass on" meaning or contentful messages" (Hutto and Myin, 2013, p. 70). The point REC aims to make is that, by avoiding the commitment to developing a robust semantic theory of mental content, what is provided is a characterization of the systematic relations that bear between the organism and the environmental features that affects it. Such systematic relations also incorporate phylogenetic and ontogenetical traits, that is, traits developed in the history both of the species and the individual, respectively. Basic cognition, then, consists in "systems engaging in informationally sensitive interactions with environmental offerings" (Hutto and Myin, 2013, p. xvi). Such informationally sensitive interactions do not involve the processing of informational contents in any truth-functional way. However, even though basic relations exhibited by (augmented) covariance between external states and brain states are not representational, but rather, informationally sensitive, they still play an important role in basic cognition and in enabling engagements with the environment and collective practices that constitute sophisticated, later-arriving forms of cognition. The principled challenges concerning a naturalistic account for semantic content discussed above are a main motivation for seriously considering REC. Since none of the available theories and notions of content satisfactorily explain in naturalistically terms how to get from non-semantic to semantic elements, the difficulties in providing a naturalistic explanation for cognitive features in representational terms might indicate that the problem is deeper than initially expected. Despite its ubiquity in philosophical and scientific research about the mind, the notion of representational contentful states as the basic explanatory resource for explaining cognition is nothing more than a theoretical posit, with no naturalistic justification.

Seen through an enactive perspective, the root problem consists in assuming a metaphysically robust notion of information, as an "objective commodity" that is traded in and out of organisms and "whose generation, transmission and reception do not require or in any way presupposes interpretative processes" (Dretske, 1981, p. vii). More specifically, REC argues that the standard physical and material resources are too strict to account for the emergence and development of semantic properties.

If it is not possible to unequivocally determine and individuate mental representation and its contents, should the project of a naturalistic account for intentionality be abandoned? There might be ways to make it work, but some fundamental assumptions might need to be re-conceived. Intentionality is usually conceived as the mark of the mental. That is, whatever attitude or capacity that is minimally intelligent (in the sense of not being

automatic, reflective behavior) depends on mentally representing something else. If there is not anything that counts as a mental contentful representation, at least as the standard presentations suppose, then it might be the case that there is no (principled) way to unequivocally distinguish between what is cognitive and what it is not. In chapter 4 I come back to enactivism to explore reasons to believe that there are interesting continuities between activities and capacities both humans and non-human living beings perform. The point at issue is to question the assumption that intentionality and intentional content can be understood as a unique phenomenon. In addition to being a unique phenomenon, intentionality is supposed to be directly modeled by propositional content, according to which cognitive states such as beliefs are considered to be "the paradigmatic intentional states and that all representational states are intentional in the same way that beliefs are" (Muller, 2014, p. 167). To question that assumption, as pointed out before, is not to deny intentionality, but to deny intentionality as it is usually understood: as equivalent to semantically contentful representation. As Muller puts it, "it is not the intentionality or aboutness of the mental that is the problem, it is thinking of that content as specifically propositional content" (Muller, 2014, p. 158).

REC emphasizes that no strictly naturalistic approach can "account for the origins of content in the world if they are forced to use nothing but the standard naturalist resources of informational covariance, even if these are augmented by devices that have the biological function of responding to that information" (Hutto and Myin, 2013, p. xv). In the REC view, the Hard Problem of Content derives from the consideration that *there is nothing in the natural world that fits the role that semantically contentful mental representations are supposed to play in cognition*. So, the notion of a semantically contentful mental representation is not naturalistically cogent; rather, it is an illegitimate theoretical posit, especially tailored for the needs of a specific framework and its assumptions. Hutto and Myin's (2013, 2017) suggestion is to abandon the traditional notion of content and pursue a different pragmatically oriented sort of approach (see also Hutto and Satne 2015; Cash, 2008; Muller, 2014; Tomasello and Moll, 2010).

3. METHODOLOGICAL NATURALISM

In addition to intentionality, the phenomenal aspect of conscious experiences is another source of uneasiness in research about mind. Phenomenal conscious experiences are the most conspicuous aspects of our lives. That there are conscious experiences with phenomenal aspects is not exactly the question; rather, the puzzlement concerns the fact that they have not yet, despite expectations and efforts, been integrated within the framework of science as other phenomena have, such as photosynthesis or cell replication, for example. Even when an explanation of the latter was supposed to be far-fetched, scientific research developed not only tools and techniques but also at least some understanding of the underlying mechanisms. This is not the case for consciousness, which remains an obscure issue, despite its pervasiveness in ordinary life. The what it is like for an organism to be, that is, the subjective feel of its own experience and why this experience exists, remains, nowadays, unexplained by any of the familiar available scientific accounts. Not only there is no explanation, but there is also very little consensus on what an answer would look like, or where and how to find an answer to it.

Nagel had already stated, nearly half a century ago, that “we have at present no conception of what an explanation of the physical nature of a mental phenomenon would be” (Nagel, 1974, p. 436). However, it seems perfectly reasonable to expect a natural explanation, as an ordinary part of the natural world. In fact, since Nagel’s remark, there have been impressive and undeniable results in neuroscientific research. So many remarkable contributions for the understanding of the brain have led to the impression that the brain is the main responsible for consciousness and that it is only a matter of time until a purely physical account for consciousness appears in terms of the neurobiological processes that happen in the brain. However, as claims the familiar distinction, there are *easy* problems of consciousness (Chalmers, 1996), that is, problems that concern the function, dynamics and structure of

consciousness, and which are supposed to be successfully by mainstream research, and the *hard* problem of consciousness, that is, that of explaining why and how those physical processes feel like something (Chalmers, 1996, 2018).

The classic dispute on the hard problem of consciousness can be mapped into materialist or physicalist positions, in one end, and anti-materialism (dualism and idealism), in the other end, with positions in between, that attempt to capture advantageous aspects of both positions. Roughly, materialism claims that consciousness is fully material – and according to current orthodoxy, a function of the brain – whereas for dualism, consciousness is at least partly non-material. Both positions seem to capture important dimensions of the phenomenon, at the same time that they are both problematic. Materialism emphasizes the causal roles that conscious states are supposed to play in overall behavior, that is, mentality is not just an epiphenomenon, whereas dualism vindicates the deep-seated intuition that consciousness is not physical – how could mere matter be conscious?

This chapter discusses the methodological constraints that an approach is supposed to follow in order for it to be naturalistic. I aim to show that, for the majority of views in research about mind, too strict constraints placed upon theories were claimed to be naturalistic. As discussed in the previous chapter, in fact, the standard neurocomputational methods and representational approaches cannot account for what can be considered easy problems, such as discrimination, categorization and reaction to environmental stimuli and the integration of information by a cognitive system. For the hard problem, that involves the phenomenal aspects, the issues are even more elusive. It is quite usual to treat the issues of intentionality and consciousness in isolation of each other. Usually, elucidating intentionality has been taken to be an easier task, an answer to which would shed light on phenomenality (for example, Dretske's (1995) treatment of qualia as representational). More recent theories treat phenomenality as the source of intentionality (Phenomenal Intentionality theories, cf. Kriegel (2013)), but also taking them to be somewhat independent. In the view I develop in this thesis, consciousness and intentionality are deeply related, and forcefully keeping them apart is misleading (see next chapter for further details).

My focus in this chapter concerns one shortcoming of traditional ways of thinking about experience that prevents an adequate understanding of it, namely, a (perhaps implicit) bias towards reductionism. Section 3.2. discusses the nature of philosophical practice and its relation to science, claiming that the expectations held by philosophers concerning the problems in the relation between what is material and what is mental are not met even by other scientific disciplines. Reduction is a very rare achievement in the natural sciences. To

expect it to be accomplished in philosophy of mind is to spouse a somewhat naive view of the sciences and scientific research and methods. Before that, I start, in section 3.1 with an overview of research about mind to show how it is stuck in the dilemma created by the reductionist assumption. Phenomenality seems to be a stubborn and elusive issue no matter what position you take. It might be the case, as I suggest, that its elusiveness stems from the way traditional questions have been formulated: by asking "what is the relation between mind and matter", the problematic assumption that mind and matter are so sharply distinct is already assumed from the start. As we have seen before, Enactivism tries to undermine this very distinction, that leads to searching for a connection between mind and matter. Section 3.3 closes the chapter with the recommendation of a more pluralistic and flexible conception of naturalism, if we are to have any better comprehension of mental phenomena in scientific terms.

3.1 Patterns of reasoning in philosophy of mind

What I would like to call attention at the moment is to a recurrent pattern of reasoning in philosophy of mind, which resembles the following dilemma:

> If a given problem cannot be explained within this [naturalistic/materialistic] framework, only two answers remain viable: either *the natural sciences will be able to explain the problem in the future* (when the theoretical and technological development reaches a higher degree of maturity), or *the problem simply falls outside the naturalistic framework* and can thus be explained away as an inefficacious epiphenomenon or a subjective illusion. (Rosfort, 2013, p. 1426, emphases added).

From the point of view I develop here, neither of these positions is satisfactory. I intend to show that this dilemma is false: from the shortcomings of explaining phenomenality in purely natural terms, it is neither the case that the problem is just a matter of technological or theoretical improvement of details nor an in principle impossible to explain character of phenomenality. However, both materialistic and anti-materialistic arguments have been influential and their considerations raise deep difficulties. As the pattern goes, no matter how detailed a physical description proposed by materialists is, the hard problem can *always* be asked: why is it that these specific physical states feel like something? Why is there any (visual) feeling at all associated with the activation of a given assemble of neurons in the region V4? There does not seem to be anything about the chemical or physical functioning of

a neuron or groups of it that make them specially important to an experience of seeing the blue sky. They function by emitting electrical signals, but there is nothing about those electric signals that connect them to the experience of seeing blue.

Given the failure in obtaining an answer to that question, it has been argued that phenomenal consciousness is then out of the scope of materialism, which makes the latter false (since it is claims that all there is physical matter). The problem here is that the only acceptable answer that would settle the question about the relation of mind and matter is a reductive form of explanation: both materialists, who keep on an incessant search for the physical (brain) states that are both necessary and sufficient for mental states, as well as anti-materialists, for whom anything short of a complete reduction is not an acceptable answer because "there is something left off the explanation".

There seems to be no way out of this stalemate. In fact, when put this way, answering the challenge posed by the hard problem of consciousness is impossible. What gives rise to the dilemma is a specific way of thinking about phenomenality. I show that this pattern (and the hard problem it generates) has as underlining assumptions the two aspects I want to draw attention to: first, the reductionism which is misleadingly assumed to be the norm in sciences and second, the reification of experience and aspects of it that distorts its real character (developed in chapter 4). I argue that, by attending to these underlying assumptions, and making the effort of avoiding commitment to them, in an enactivist inspired way, there might be prospects to overcome some of the explanatory and metaphysical traps that prevent us from understanding phenomenal consciousness.

3.1.1 Cartesian variations: materialism

A basic aspect of methodological naturalism consists on the emphasis on empirical research and the rejection of the existence of distinctive philosophical methods and problems.[21] There can be less or more strict naturalists, in which I follow others in associating with reductionism (J. Clark, 2016, for example). Strict naturalism "tends to privilege science in such a way as to downplay or explain away elements of our common understanding of

21 Strict naturalist views also often claim that scientific reasoning is able to "rule out answers to philosophical questions that are incompatible with scientific findings" (Rosenberg, 2014, p. 17). The dismissal of philosophical reflection is quite common within strict naturalist views.

human experience" (J. Clark, 2016, p. 4). A strict methodological naturalism presupposes that there is a privileged method, which has been traditionally taken to be that of the natural sciences. Not only are natural sciences, especially Physics, the best method, but the only method which can achieve legitimate knowledge about reality. A very influential picture of the sciences is that of a building: the basis of all science is Physics, to which other levels or layers are added, in a hierarchical and compound structure: Chemistry, Biology, Behavioral Sciences, Psychology and Social Sciences and so on, by means of the discovery of the laws of nature that bridge those levels (which would allow for logical inferences, such as deduction and generalizations). The possibility of psycho-physical reductionism was a lively expectation from the mid 20th century on and carried along a further assumption, the thesis of the unity of science, according to which

> it is not absurd to suppose that psychological laws may eventually be explained in terms of the behavior of individual neurons in the brain; that the behavior of individual cells – including neurons – may eventually be explained in terms of their biochemical constitution; and that the behavior of molecules – including the macro-molecules that make up living cells – may eventually be explained in terms of atomic physics. If this is achieved, then psychological laws will have, *in principle*, been reduced to laws of atomic physics (Oppenheim and Putnam, 1958, p. 7).

Such a view still has some bite, at least in some circles. More recently, Bickle (2006), for example, has argued for a *ruthless reductionism*, according to which molecular neuroscience, along with appropriate bridge principles, will be able to account for all the laws and facts of psychology and cognitive activities, such as perception, attention and memory, and even social cognition. The aim is to discover the connections between psychological concepts and molecular-biological mechanisms. In short, Bickle claims for mind-to-molecule reduction, as stated by the unity of science thesis. In addition to that, Bickle also tries to evade the importance of philosophical reflection, for example, by suggesting that philosophical reflection is not useful in the understanding of scientific phenomena.

In recent philosophy of science, however, the situation has significantly changed. It has become clearer in the last 50 years how scientific practice is quite different from the idealizations that were typical of earlier Logical Empiricism-inspired philosophy of science that lent legitimacy to reductionism. However, it seems that the lessons of more recent philosophy of science have not yet been fully appreciated by researchers in philosophy of mind, who still have as the explanatory goal a reduction that closes the obstinate explanatory gap between mental and physical processes.

The standard history of the mind-body problem is usually told as beginning with Descartes's sharp distinction of mental and physical properties. Undoubtedly, the mental

aspects of human experience have always been a central issue for philosophers and lay people of all times but the Cartesian formulation is paradigmatic for his remarks are still at play in contemporary arguments. Descartes's formulation has established the quest for the ontological relation between mind and matter. In fact, the mind-body problem was not exactly a problem for Descartes, who actually had a solution to it. The problem is clearly raised by Elizabeth of Bohemia, when she asks how can an immaterial substance such as the mind affect matter.

Until the beginning of the last century, there was no relevant alternative to Descartes's substance dualism, even with his somewhat odd solution. That, however, changed, when empirical sciences such as Physics, Biology and Chemistry started to provide successful solutions to a variety of problems that led to the idea that a similar success would be prone to be achieved concerning the mind. The existence of a mental substance which is established through introspection did not fit the new scientific criteria for observation. More specifically, Papineau (2002) calls attention for the fact that for the first time in the history of science, there were evidences for the causal closure of the world, that is, the idea that all physical effects have physical causes.[22] So if mental states have physical effects, they have to be physical. If everything can be explained causally, then mind is no different from other instances of matter. Unless mind is part of the physical world, we could not make sense of how mental processes can have causal effects in the physical world. The first influential approach to explore such possibility to the fullest was Behaviorism.

According to the new scientific standards, Psychology is – or should be – objective and experimental (Watson, 1913, p. 158). Given the intrinsic inaccessibility of mental states from a third-person point of view and the rejection of introspection as a source of reliable information about the mind, what are the options for the study of mind? In order to respect scientific standards, the data should be shareable and intersubjectively observable. So, the study of mind is to be carried out through observable behavior (which includes verbal reports). Behaviorist views, then, addressed both methodological and metaphysical concerns for a science of mind. Methodologically, instead of a science of mind itself, Behaviorism claims psychology to be the science of behaviors and dispositions. According to Skinner (1953/1980), for example, it is not the case that inner states do not exist, but actually that they are not relevant to the functional analysis of behavior (Skinner, 1980, p. 42). That is the main tenet of Psychological (also called Radical) Behaviorism, referring to the specific research

22 That there are proper reasons for the change towards a more materialistic view or whether the growing influence of materialism has been a trend have been disputed. For Lycan (2009), there are no more problems with dualism than there are with materialism. Both are problematic, and even where there are arguments for materialism, such as Papineau's argument for the growing evidence of causal closure of the world, they can be doubted or are at least compatible with weaker forms of dualism, such as epiphenomenalism.

program within Psychology, mainly developed by psychologists Pavlov, Watson and Skinner. According to Psychological Behaviorism, it is possible to explain, predict and control the behavior of humans and animals on the basis of external causes: external physical stimuli, responses, learning histories and reinforcements. In a nutshell, Psychological Behaviorism aims to explain behavior in terms of how environmental regularities control it and how behavior itself can be changed by the manipulation of those regularities. Psychological Behaviorism was soon widely thought to have been refuted by the Cognitive Revolution, in which Chomsky (1959) and others claimed that it is not possible to explain human cognitive capacities, which exhibit recursivity and compositionality, with such deflationary sources (the story of how cognitive science has been carried out, in terms of inner rules and representations, has been more extensively discussed in chapter 2). The similarities between Enactivism and Psychological Behaviorism are very often emphasized by critics. More specifically, critics have associated Enactivism with Behaviorism in a negative fashion, specially due to the rejection of the postulation of inner states as explanatory causes of behavior (I come back to this issue in chapter 4). As we have seen in the previous chapter, the postulation of contentful representations is precisely the central tenet of mainstream Cognitive Science. Recent appraisals of Behaviorism have claimed that it cannot be so easily dismissed (see Barrett, 2019, for example).

Mainly developed by philosophers, most notably, those from the Vienna Circle (Carnap 1949, 1932/2002, Hempel 1935/1980, for example), Logical Behaviorism proposes a "physicalist conception of psychology" (Hempel, 1980, p. 18). Logical Behaviorism claims that the correct understanding and use of psychological concepts will show that the mind-body problem is a pseudo-problem: "logical behaviorism claims neither that minds, feelings, inferiority complexes, voluntary actions, etc, do not exist normally or that their existence is in the least doubtful. It insists that the very question as to whether these psychological constructs really exist is already a pseudoproblem" (Hempel, 1980, p. 18). For example, the following sentence, which contains the psychological concept "pain", "Paul has a toothache", has the same conditions of verification as the following physicalist sentences:

> a. Paul weeps and makes gestures of such and such kinds.
> b. at the question "what is the matter?" Paul utters the words "I have a toothache"
> c. closer examination reveals a decayed tooth with exposed pulp.
> d. Paul's blood pressure, digestive processes, the speed of his reactions, show such and such changes.
> e. Such and such processes occur in Paul's central nervous system (Hempel, 1980, p. 17)

So, “has a toothache” is actually, an abbreviation of one or a conjunction of the sentences above (though that list is not exhaustive). There is no underlying mental event, for all psychological states are to be understood in terms of the dispositions of an organism to behave. A psychological state which has no behavioral or observable effects, can be disregarded as being “metaphysical”, that is, meaningless.

A correct understanding of phenomena depends on a physicalist approach, not only for natural sciences, but also for the “sciences of mind and culture”. Logical Behaviorism’s main assumption is that Physics (or physical language) is the basic language for all sciences, subscribing to the “unity of science” thesis, in which all meaningful sentences can be shown to be either replaced, eliminated or translated into physical sentences. Hence, psychological statements, insofar as they are meaningful, can be *reduced* to a statement containing only physicalist terms without change of content. More generally, Carnap (1932/2002) claims that “if the physical language, on the grounds of its universality, were adopted as the system language of science, all science would become physics” (Carnap, 2002, p. 39). Then, there would be no insuperable differences between Physics and Psychology (Hempel, 1980, p. 16). The true function of mental concepts and terms consists in abbreviations, which make “possible the concise and complete description of a state of affairs the expression of which would otherwise be very complicated” (Hempel, 1980, p. 17). According to the view I advocate here, it is possible to say that they were correct in rejecting the existence of distinctive mental entities, but wrong in the commitment to the reductionism of psychology to physics as an a priori principle for the ontological legitimacy of phenomena.

Differently from Logical Behaviorism, Identity Theory claimed for the identity between mental and physical processes to be seen as an empirical thesis, that is, as a working hypothesis instead of an a priori logical constraint. For identity theorists, psychological states are not merely correlated with brain states, but actually are *identical* to brain states. In a sense, Identity Theory can be understood as a middle-way solution. There are genuine inner mental states which cannot be identified with behavior or dispositions. But, for identity theorists, those inner states are not non-physical, but rather, neurophysiological states. Differently from the a priori identity that holds by means of meaning only, as in the identity of triangles and trilaterals, or pain and behavioral dispositions (in Logical Behaviorism’s account), for example, but similarly to contingent truths discovered empirically, such as the identity of the morning star and the evening star, psychological and physical processes are numerically identical. Other scientific identities provided the standards for such a view, for example, lightning and electrical discharge, water and H_2O, temperature and molecular kinetic energy.

Exactly as those identities were eventually discovered to be true, the hypothesis is that the identity of psychological states and brain states is yet to be discovered.

As the identity-theorists themselves acknowledged, much of their conviction rested on somewhat scientificist and mechanicist expectations:

> It seems to me that science is increasingly giving us a viewpoint whereby organisms are able to be seen as physico-chemicals mechanisms: it seems that even the behavior of man himself will one day be explicable in mechanistic terms (Smart, 1959/2002, p. 61).

As predicted by the usual pattern of reasoning, identity theory shortly ran into difficulties. One of the main objections concerns the kind of identity that is being asserted, on whether it is a type or a token identity, a shortcoming that was explored by functionalists (see below). Token-identity physicalism is the relatively uncontroversial claim that each occurrence of a mental state is a physical occurrence in the brain. Type-identity physicalism claims that types of mental states reduce to physical particulars so not only my instantiation of pain is identical to the activation of C-fibers, but rather, that the mental kind pain is identical to the activation of C-fibers. The main problem with type-identity physicalism, the interesting and stronger type of identity theory, is that it is too restrictive: unless an organism actually possesses C-fibers, it could not feel pain, something that was objected by Fodor (1968, 1975) and Putnam (1967/1980, 1975), giving rise to Functionalism.

The main argument for Functionalism is that psychological states are, in fact, *multiply realizable*, that is, the specific material of which the individual is constituted is not supposed to play any difference as long as it plays the adequate function. Many analogies can be drawn, from money to motor engines, but the most influential metaphor was indeed the reference to computing machines. Computations can be performed either by digital computers or hydraulic machines, or anything else really, provided that they implement the same function.

A Turing-machine is a mechanism (not necessarily physical) which exhibits discrete states according to a finite set of rules: given a finite set of inputs, outputs and states, a Turing-machine specifies a finite set of conditionals such as “if the machine is on state S1 and receives the inputs Ij, it delivers the output Ok and moves to state S2”. For Turing-machines, what is important is not the sort of material in which the machine is implemented, but rather the function that is performed, which plays a causal role in the system. Then, to be in a psychological state such as pain does not depend on the activation of C-fibers, but rather of any state that performs the same function as the C-fibers in humans.

A main problem with machine functionalism, as opposed to type-identity theories, is that it is too liberal. Any system that implements the adequate function, then, is said to have pain. That would include the population of China (Block, 1980), given that they are properly functionally organized: if the population of China is organized in a way such as every individual follows instructions just like in a neuronal system, would this system undergo phenomenality? If it is possible for this system not to display phenomenality, it is not the case that functional organization exhausts phenomenal consciousness. This leads us to the influential anti-materialist arguments described below, which rely on the impossibility of the materialist accounts to explain phenomenality.

3.1.2. Cartesian variations: anti-materialism

Despite the permanent excitement concerning the possibility of providing a thoroughly materialistic approach to mental phenomena, either in functional or more strict material terms, antimaterialist arguments have insistently reappeared. Arguments such as the explanatory gap argument (Levine, 1983), the knowledge argument (Jackson, 1982, 1986), the modal argument (Kripke, 1980) and the conceivability argument (Chalmers, 2002), all indicate that there is a *hard problem of consciousness* (Chalmers, 1996) which preclude materialistic views to be true. Their general strategy is to imply an ontological gap from an epistemic gap between physical and mental processes. From the fact that the phenomenality of mental processes has been deeply resistant to standard scientific accounts, it has been suggested that the nature of the mind is either not reducible or not material at all.

As I have indicated before, it is reasonable to expect that a materialistic scientific account can be provided for consciousness, as many other seemingly difficult phenomena have been dealt with by the sciences. However, it is supposed that the natural sciences operate with a notion of reductive explanation, where a high-level phenomena is conceptually connected (reduced) to a low-level process described in a more basic language. However, as pointed out by the anti-materialist position, “the mere fact that we can conceive any given physical process without consciousness suggests that we cannot have a fully satisfying explanation of consciousness in physical terms” (Chalmers, 2002). An explanation is supposed to conceptually connect two phenomena in the sense that there is no explanatory

residue left off. If it is possible to conceive of the subject or organism not to have phenomenal properties, then we are at least in need of confrontation of an *explanatory gap*, as in Levine's (1983) articulation with the aid of Kripke's modal argument (1979). I briefly present the explanatory gap and introduce the assumption that both materialistic and anti-materialist arguments exhibit, namely, the reductionism from phenomenality to physical states, similarly as what supposedly happens to other phenomena in the natural sciences (which we will see below is not the case).

Following Kripke, Levine (1983) articulates the notion of *explanatory gap*, an epistemic limitation in our understanding of mind which follows from Kripke's modal argument against materialism. In *Naming and Necessity* (1980), Kripke argues that proper names and definite descriptions actually have distinct semantic behaviors, and then, they cannot be synonymous or equivalent. One of the contexts in which the behavior of these two kinds of expressions differs is in modal contexts. A description such as "the writer of *Nicomachean Ethics*" can change its reference across different possible worlds. In the actual world, it refers to Aristotle. On the other hand, proper names such as "Aristotle" refer to the same object both in the possible worlds where he exists and in the actual world. So, according to Kripke, the reference of proper names is rigidly designated, whereas the reference of definite descriptions may change. Furthermore, the modal status of true identity sentences which relate two rigid designators is necessary truth, if true, and necessary falsity, if false, even though the truth of the identity might be discovered a posteriori. Kripke extends his considerations about the metaphysical and epistemological behavior of proper names and the sentences in which they appear to other kinds of expressions. Expressions such as "various species names, whether they are count nouns such as 'cat', 'tiger', 'chunk of gold', or mass terms such as 'gold', 'water', 'iron pyrites'" and also "certain terms for natural phenomena, such as 'heat', 'light', 'sound', 'lightning', and, presumably, suitably elaborated, to corresponding adjectives – 'hot', 'loud', 'red'" (Kripke, 1980, p. 134) "have a greater kinship with proper names than is generally realized" (Kripke, 1980, p. 134).

Sentences like "heat is the motion of molecules" and "pain is the activation of C-fibers", then, are expected to behave similarly since, in both cases the expressions that figure in them, "heat", "the motion of molecules", "pain" and "activation of C-fibers", are rigid designators.[23] Those identity sentences are necessarily true, that is, true in all possible worlds

23 Kripke says: "it should be clear from the previous discussion that 'pain' is a rigid designator of the type, or phenomenon, it designates: if something is a pain it is essentially so, and it seems absurd to suppose that pain could have been some phenomenon other than the one it is. The same holds for the term 'C-fiber stimulation', provided that 'C-fibers' is a rigid designator, as I will suppose here" (Kripke, 1980, p. 149)

where the referred objects exist. To have it otherwise would be to have a logically impossible world. However, these sentences exhibit an "illusory contingency", that means, it seems coherent to question their truth. They are conceivably false, despite the analysis of their semantic behavior.

The illusion of contingency can be successfully explained away in the heat case but not in the pain case. It is possible to conceive a world where there is heat without the motion of molecules. The illusion arises because when we refer to heat, we can refer to the objective phenomena which exists independently of our sensations of it. What is contingent is that we *feel* the sensation of heat when there is heat. As Levine (1983) says, the real contingent sentence involving heat and the motion of molecules is: "the phenomenon we experience through the sensations of warmth and cold, which is responsible for the expansion and contraction of mercury in thermometers, which causes some gases to rise and other to sink, etc., is the motion of molecules" (Levine, 1983, p. 355).

The same would apply to psychophysical identities, such as "pain is the activation of C-fibers". *Prima facie*, it would seem possible to conceive of pain as occurring without the activation of C-fibers in another world. However, if that happened, that is, if we could imagine pain without the activation of C-fibers, or imagine C-fibers without the occurrence of pain, then there would be no phenomena left to refer to.

In the case of heat, it is possible to refer either to "heat" or to the "sensation of heat", and the reference would be different. But in the latter case, "pain" and "the sensation of pain" refer to the same object. As Kripke says "there is no 'appearance' beyond the mental phenomena itself" (Kripke, 1980, p. 154). To put it more sharply, there is no way for pain to occur without being felt as pain. So, the illusory contingency cannot be explained away in the case of psycho-physical identification. If the sentence "pain is the activation of C-fibers" is not necessarily true, then it must be false. To Kripke, these considerations show that materialism is false.

Levine (1983) emphasizes the epistemological consequences for materialism, when Kripke's considerations are accepted. He argues for a weaker claim: rather than being false, as Kripke claims, by being conceivably false/not necessarily true, "psychophysical identity sentences leave a significant *explanatory gap*, and as a corollary, that we don't have any way of determining exactly which psycho-physical identity statements are true" (Levine, 1983, p. 354). Levine says that besides being apparently contingent, there is another difference between general theoretical and psychophysical identities which actually explains the illusion of contingency. According to him, whereas the general theoretical identities are

fully explanatory, psychophysical identities are not. To the first kind of identities, to describe their causal role is enough: what it causes and how it is caused. So in the case of heat, it causes the expansion of some gases, for example, and is caused by the motion of molecules. However, in the case of psychophysical identities, the causal aspects are not enough, because a causal description leaves out the crucial aspect of the phenomenon of pain, that is, its phenomenal character. These considerations lead to problems not only to mind-brain identity theory, but to any theory that aims to relate the mental to the physical, for example, Functionalism. Any materialist description will fail to capture the phenomenal dimension of experience. In fact, for the causal role to be fulfilled does not even imply in the having of an experience (as in the China argument). This is the explanatory gap: the impression left by materialistic descriptions that there is something left off the explanation. As Levine says, "there is more to pain than its causal role, there is its qualitative character, how it feels; and what is left unexplained by the discover of C-fiber firing is *why pain should feel the way it does*" (Levine, 1983, p. 357, author's emphasis). So, the connection between material events and the phenomenal aspects of mental events is not obvious, not fully explanatory nor intelligible and, and if it is to hold, as materialists suppose, it needs to be further explained.[24]

As we can see, all major views in philosophy of mind take as a background assumption the explanatory goal of reduction from mental to physical states. They vary in the degree of the possible achievement of this goal, but all discussions take place against the ideal that the only acceptable explanation to close the gap is that the mental is reduced to the physical. The underlying assumption is a reductivist framework: that only legitimate explanations are the ones located at the basic level of Physics and that those explanations are not subject to any epistemic gaps. Reduction is assumed as the ultimate explanatory goal, when in fact, it has hardly ever been accomplished in the history of science, as discussed in the next section. Stemming from this unreal explanatory expectation, there arises the view that mental phenomena are unique in its irreducibility, being a sort of mysterious or unaccountable phenomena.

I finish this review section by claiming that the hard problem is stubborn and resembles a sort of obsession instead of an actual problem. Unless there is a complete reductive relation that explains away the illusion of contingency, it will be insisted that there is something left out of explanation. In fact, not even a complete scientific account would

24 There have been many moderate attempts that wish to preserve aspects from materialism at the same time as allowing for the peculiarity of mental phenomena, such as some kinds of non-reductive materialism and emergentism. I will not discuss them in detail here, but they exhibit the same flaws as the original views, that is, that there is something "left off" the explanation.

provide immunity to the explanatory gap and, defined this way, the hard problem of consciousness is actually impossible to be naturalistically solved.

Attendance to the history of science should teach both sides of the debate. It is not the case that reductions are at all common in science. In fact, reductions are rare and, usually, not a straightforward matter. The fact that the sciences do not work by reduction does not render its methods and entities unexplainable, or in possession of mysterious properties. So the source of a supposedly unique puzzlement about consciousness lies somewhere else. As we will see, it lies in a distorted image of experience that has defined research about mind.

3.2. Philosophy of science

What underlies all the major views is the shared assumption that "intertheoretic reduction is the norm in the natural sciences, and this assumption motivates both reductionism and the idea that the explanatory gap poses a unique and disturbing problem" (Horst, 2007, p. 23). Regardless of their disagreements on the outcomes of reductionist projects, the majority of views in philosophy of mind nevertheless agree that the only intelligible and acceptable explanation is for psychology to be reduced to a more basic science. Unless a reduction is carried out successfully, psychological phenomena are regarded as not sufficiently legitimate scientific phenomena.

One additional feature of the very project of naturalizing consciousness and intentionality seems to imply that mental features cannot be in principle natural, or are not natural enough, and are so in need of being reduced to something more basic. This sense of "natural" that is required for an explanation to be considered scientifically acceptable is overly restricted. Only resources from a basic, lower-level science, such as Physics, Chemistry, or Neurobiology even (by being a middle step to the full reduction to Physics) could provide the right natural account for psychological phenomena. That does not resonate well with current philosophy of science.

One field that offers interesting insights for various aspects of the problems at issue here is Biology. Biology seems to defy most formal models of explanation. Biological phenomena can range from millions of years to few seconds in a time scale and thematize a single organelle or a whole biome. Very often, as in the celebrated case of the gene (see

below), there is complex entanglement within the levels of explanation that cannot be neatly captured by traditional theories in philosophy of science. Traditional theories invoked mechanistic explanations and/or generalization of laws, according to which a phenomenon can be explained in terms of decomposing and localizing its parts and establishing their functioning in terms of general laws. However, the peculiarity of biological phenomena led to the augmenting of models of scientific explanation, turning away from those models in favor of more nuanced ones.

For example, after the discovery of the DNA molecules (Watson and Crick, 1953), the widespread expectation was that Molecular Biology would soon provide a reductive explanation of the functioning of organisms in terms of entities and functional structures in the cell. The combined efforts of physicists, chemists and biologists made possible the discovery of the mechanisms responsible for genetic inheritance, known since Mendel's research. In theory, it would be possible for Classical Genetics and even other biological fields, for example, Evolution and Developmental theories, to be reduced to molecular mechanisms. However, the quick discovery of growing complexity on how genes work cast significant doubts upon whether DNA alone could be responsible for the entirety of biological processes. Discovery of overlapping genes, split genes and alternative splicing indicated that there was no direct mapping from the traits studies by classical genetics to the biochemical mechanisms of DNA.

It has also become clearer that explanation in terms of derivation from laws of nature, as the philosophy of science modeled by physics expected, was not suitable for biological phenomena. Biological phenomena cannot be accommodated within the more traditional models of Physics that involved generalization and natural laws, for its phenomena are very different from those of Physics. The dynamism and the influence that contingent factors put upon biological phenomena make it very difficult for generalizations to hold. Biological explanations admit exceptions, are limited to certain specific time and space and do not support counterfactuals (that is, changing a variable does not necessarily change the outcome of the process). The failure of the traditional models for Biology reinforced the need for developing more nuanced and complex models for scientific explanation. Many researchers suggested that the understanding of biological models demanded an approach that integrates different working properties and entities (often at different levels) that operate in different times (Darden, 2005). As argued in what follows, that does not undermine naturalistic attempts to understand biological phenomena. Taking those complexities as problematic only harms those who hold too strict constraints for explanation in science.

The existence of gaps in other fields should tranquilize philosophers of mind because explanatory gaps are, in fact, the norm in the sciences. The point is that "if reducibility is a criterion for ontological legitimacy, it is not only intentionality and phenomenality that are threatened, but phenomena of other sciences as well, such as organisms, species, metabolic processes and molecules" (Horst, 2007, p. 80), which would then turn out to be equally ontologically suspicious as mental terms are. That does not entail that biological concepts are illegitimate or stem from an illusion.

Let us consider again the case of Molecular Biology. Following the discovery of the DNA molecule, attention turned away from developmental, historical and ecological relations between organisms and environment because genes were considered to be the self-reproducing unit that determines a particular trait in an organism. According to a widespread expectation expressed by the Molecular Biology community, the clarification of the DNA mechanisms would allow one, by having a "large enough computer" and the DNA sequence of an organism, to "compute" the organism. However, as stated by Lewontin, "organisms don't even compute themselves from their own DNA" (quoted by Callebaut, 1993). An organism is, rather, and this is a fundamental point, a "consequence of the unique interaction between what it has inherited and the environment in which it is developing (…) which is even more complex because the environment is itself changed in the consequence of the development of the organism (Lewontin, as interviewed by Callebaut, 1993). It turns out that genes do not actually solely determine any of the traits an organisms exhibits: "*every* trait is a product of a combination of genetic inheritance and environmental influence through development" (Horst, 2007, p. 52, emphasis added).

Then, what the developments in Biology require for adequately understanding the complexity of intertwining processes of different levels is to acknowledge the organism as a whole in its relation to its environmental niche: "both the theory of evolution and developmental biology require us to view living organisms historically (over evolutionary and developmental time frames) and as systems that are open to their environments. (…)" (Horst, 2007, p. 52). This way of putting things makes a significant difference on the issues I discuss here. I have only quickly described how the gene cannot be understood as the biological mechanistic unit, and I have taken this specific example for its relevance in showing both that expectations for scientific reduction are usually wrong and that organisms need to be understood as a whole in the dynamic interactions they develop with their environmental niches.

The goal of achieving a complete reduction from special to more basic sciences has been mostly abandoned because it is simply not feasible. Full reduction has not been carried out for any special science, and it does not seem very likely to be carried out for psychology. But that does not mean that psychological phenomena cannot be given a (relaxed) naturalistic account. As Horst puts it, "to hold the sciences of the mind to such a standard would be to hold them to a much higher standard than we hold the other special sciences" (Horst, 2007, p. 71).

3.3 The disunity of science

In fact, it is to the *disunity* of science that researchers have more recently turned attention. The increasing complexity of methods and approaches not only in life sciences, but in other domains as well, including Physics, has transformed the principles that guide scientific research. Instead of the traditional claim of providing a logical structure of science, scientific explanations are currently understood in terms of their disunity. Cat (2017) summarizes the new attitude:

> against essentialism, there is always a plurality of classifications of reality into kinds; against reductionism, there exists equal reality and causal efficacy of systems at different levels of description, that is, the microlevel is not causally complete, leaving room for downward causation; and against epistemological monism, there is no single methodology that supports a single criterion of scientificity, nor a universal domain of its applicability, only a plurality of epistemic and non-epistemic virtues (Cat, 2017).

Recent philosophy of science shows a very different picture of how the special sciences function and how they are related to other scientific fields. At least since the 1970's, "the prevailing view is that the special sciences are autonomous and not in need of vindication by proving their reducibility to physics" (Horst, 2007, p. 47). The axiomatic, derivative or deductive model that was supposed to have been successfully applied from Classical Physics to other fields is inconsistent with how scientific disciplines have evolved and how they relate to each other. The take away message is that "*if* post-reductionist philosophy of science has it right, *then* philosophers of mind need to do some fundamental rethinking" (Horst, 2007, p. 6).

Many might rush to think that these shortcomings of traditional views on science undermine their epistemological relevance and significance. There is fear that without some sort of reduction, epistemic relativism gains force (as in the *cartesian anxiety*, referred to in

chapter 1, and identified by Varela et al., 1991). In fact, the problem is exactly the opposite: to assume that it is possible to develop a view that is completely neutral and objective, a supposed view "from nowhere". Such a view is indeed not only a view, but a view that takes one very specific perspective: one which assumes that it is possible to disembody human and living being activities. In a more general sense, the problem is to suppose that scientific explanations and theories can unequivocally capture essential properties of the world without any influence of the pragmatic contexts in and for which scientific theories are developed for.

One fundamental caveat, then, depends on the acknowledgment that the pragmatic aspects of science do not undermine its cognitive value. It is not the case that science is just a set of beliefs with no epistemic importance. Even with the epistemological limitations I am discussing here, specially in relation to the unrealistic expectations of complete neutrality and objectivity, the fact is that scientific theories are still the best we have for an understanding of the world. Being fallible and dependent on a variety of pragmatic aspects does not entail that it is relativistic or not aiming for truth. Actually, I emphasize it again, it is thinking otherwise that prevents an adequate understanding of natural phenomena, as the case for phenomenality informs us. To think otherwise is to posit aprioristic constraints that go against the very principle of methodological naturalism, according to which philosophy and the sciences reciprocally inform each other. The application of extrascientific normative standards of unity or reducibility is what contrasts with properly naturalistic criteria in consonance with real scientific practices. The upshot is that, "insofar as we want our understanding of the mind to be informed by the best understanding of the sciences available today, we need to move *beyond* the reductionist view of science to do so" (Horst, 2007, p. 62).

So, how mental phenomena are supposed to be treated within science? In contrast with a naturalism that allows only for the strict scientificist tools and methods of Physics to play a legitimate role in explanation, "to fully understand certain features of the natural world – features that include our own understanding of our own human practices and activities – requires synthesizing findings from, *inter alia*, anthropology, developmental psychology, comparative psychology, cognitive archaeology and neuroscience" (Hutto, forthcoming). The challenge, in understanding the phenomenal aspects of experience, requires taking the varieties of scientific fields in a complementary, non-competing way (Hutto, forthcoming). The terms of the specific debate of mental phenomena need to be rethought in order to avoid misconceptions. So, instead of disavowing the importance of philosophical reflection, an adequate understanding of mental phenomena is in need of it. Very often, especially in a naturalistic framework, philosophical reflection is considered to be somewhat secondary, as

an aid for scientists, who do the real explanatory work, that of establishing (or discovering) “the theories, models, findings, observations, experiments” (Rosenberg, 2018, p. 4). As the more recent philosophy of science has showed, those theories, models and so on, are not held without a great deal of background presuppositions. This lesson applies to ordinary objects, and it is critical for philosophical concepts such as phenomenality, to which I now turn to, in chapter 4.

4. WHAT IT IS LIKE TO BE AN ENACTIVIST

As discussed throughout this thesis, radical enactivism's main tenets are its anti-representationalism about basic cognition, that is, that not all cognitive activity is necessarily dependent on contentful representations, and the strong embodiment thesis, that is, the idea that cognition is constituted and shaped by the patterns of interaction of an organism, dependent both on biological aspects and (in some cases) involvement with cultural and social content-involving practices. Based on these two tenets, (radical) Enactivism then distinguishes between two kinds of cognition, basic contentless cognition and content-involving cognition. Basic, contentless capacities are such that organisms are able to act on the world, but without the need of representing it in semantic ways. The capacity of representing the world in truth-functional ways is to be considered as an achievement, dependent on the establishment of shared and public practices, on which basic cognition scaffolds. In sum, cognitive systems do not pick up or take in (or register, or encode, or retrieve, as there are many variants of this assumption) any informational contents simply because "there are no informational contents out there in the world, independent of system, to pick up and take in" (Hutto and Myin, 2014, p. 252).

As discussed before, Enactivism takes seriously the claim that there is no ontological distinction between mind and body and, more specifically, that there is no special entity or property in a living system that marks a difference from what is mental or cognitive and what it is not. Instead of being in need of a reduction to a more basic level, property or entity, enactivists take some capacities to be biologically basic and spanning throughout the whole spectrum of living organisms. Seemingly disparate organisms, such as bacteria and human beings, are seen as sharing some features that add up to cognition concerning their biological relation to the environment. One shared feature is the directed behavior to the environment that constitutes a basic autonomy. The basic autonomy unfolds within a dynamic

and ever changing context, with which organisms exchange matter and energy. Some enactivist researchers have emphasized the basic situation of living organisms as in permanently precarious and fragile, where organisms need to find an optimal self-regulatory situation (Di Paolo et al., 2017). The dynamic relation with the environment requires the development of flexible and adaptive behaviors in order to achieve systemic cohesion and self-preservation. That way of putting things is captured by the notion of autopoiesis, one of the bases for understanding the continuities between mind, life and experience. The suggestion is that it would be possible to provide a different starting point for explaining phenomenality and intentionality in terms of these basic capacities. The traditional aim of naturalizing mentality by forcefully assigning a place for it in the natural world is misguided. The key point for an enactive perspective is to take the dynamical character of living organisms as fundamental, instead of taking living organisms as mechanistic, predefined and static entities which irreflectively respond to physical causes. There is no way to overstate the importance of taking the nature of livings systems as non-mechanistic entities The idea is to avoid the tempting tendency to distinguish between mental and physical processes that lead directly into the epistemological and explanatory traps of asking how can mere physical systems feel like something.

But then, how can problems concerning phenomenality be satisfactorily answered in a radical enactivist account? Are its antirepresentationalism and its strong adherence to embodiment sufficient to dismiss the pull of the hard problem of consciousness? It is possible that even though some of the issues can be in fact left behind in an enactivist framework, there is still room for asking the hard problems of consciousness. That might be due to the fact that, usually, characterizing of the notion of experience incurs in a very narrow-minded or theory-laden description of it. The way problems about consciousness are traditionally formulated are not neutral or naive, because they presuppose certain views about experience and its objects. Too much attention has been given to the ways philosophers have been considering the mind-body problem: by trying to isolate properties of experience, it has been often the case that the notion of experience at debate is formulated through a process of reification, that is, a process of taking abstracted features of experience to be the causes themselves of cognitive capacities.

4.1 REC's proposal

We have so far considered reasons not to expect that a full reduction from both psychological states and semantic contents to physical states is going to be successfully carried out. Does this result prevent the possibility of developing a naturalistic account for mind and cognition? Is there a way to deal with the hard problem without abandoning a naturalistic, scientific account for mind?

The question of where does phenomenality fit in the enactivist story is pressing. Hutto and Myin (2013, ch. 8) have claimed that, differently from other enactivists, to solve the hard problems of consciousness it is not enough to extend the supervenience basis of mind to include the rest of the body and the environment. As Prinz (2006) have put, that phenomenality is associated with bodies and environment is as baffling as it being a function of the brain. So, an externalist basis is not enough to solve the hard problem of consciousness; an externalist view would be subject to the same shortcomings as the more neurocentrist positions, that is, the problem of intelligibly relating mental with physical states. Hutto and Myin claim that it is possible, or at least an "open question", that phenomenality is brain-bounded.

Hutto and Myin discuss metaphysical and epistemic issues. While it is (possibly) the case that internal neural states are sufficient for phenomenality (at least some level of it), explaining the epistemic gap necessarily involves the strategy of "going wide", that is, the appeal to external explanatory resources. Hutto and Myin claim that it is possible for phenomenality to happen only in narrow terms, that is, in terms of the brain alone. However, that would allow for a limited account of phenomenality: "focusing entirely on internal brain-bound activity may be appropriate if one is interested only in producing or replicating phenomenality by limited or minimal means" (Hutto and Myin, 2013, p. 163). If, however, "we want to understand the place of phenomenality in nature – how it originally came to be, and why it has the features it has – we are likewise forced to widen our scope" (Hutto and Myin, 2013, p. 163).

What they argue for is the possibility that it is possible to have some sort of basic phenomenality to occur without the need of external factors. That is evidenced in arguments such as swamp men, direct neural manipulations of brains in vats and dreaming, for example. Those arguments indicate that it would be possible for phenomenality to happen without a proper or normal interaction with the environment. However, they also point out that these

sorts of cases would allow only for a very limited phenomenality. So, even if it is possible that subjects in these conditions can indeed experience phenomenality, it is not clear what kind of experience they would have and how it would compare with regular experiences. For, if REC is correct, there is no distinctive property or entity to guarantee or evaluate sameness or difference in experiences (the notion of content, for example, is not available to play such a role). Since REC takes experiences as the particular and dynamics interactions over time and space of subjects and the environment, it would be specially difficult to adequately assess those experiences.

In any case, it is fundamental to reject the view according to which phenomenality involves any other sorts of special properties, such as ineffability, for example. Famously, Dennett (1991) has questioned the coherence of the notion of qualia, as the properties that conscious experiences possess which are supposed to account for their qualitative aspects. According to him, the notion of qualia, traditionally characterized as properties of experience being ineffable, intrinsic, private and directly or immediately apprehensible does not refer to any phenomena at all. It is important to emphasize that Dennett (as do the enactivists) does not deny that experiences are felt as such by the subjects, or that experiences can have properties, but rather, that experiences exhibit those specific properties. It is the attribution of those specific properties to experience that make them impossible to be intelligibly explained. The mistake assumed in many debates about experience is to presume "that we can isolate qualia from everything else that is going on" (Dennett, 1991, p. 383). Talking about qualia, raw feels, phenomenal, subjective and qualitative properties of experience are all misleading formulations that entail the idea that experience is specially difficult to understand because of those properties. Thinking about experience in terms of its supposed properties of being ineffable, intrinsic, private and directly and immediately apprehensible is elusive for those notions, when pushed to the limits, make no actual sense. The central issue is the supposed need to keep a core that guarantees some sameness of experience throughout time or change of subjects. But since this core is fully private and ineffable, it cannot be addressed in any third-person or objective perspective. Familiar skeptic scenarios of interpersonal and even intrapersonal experience arise when experience is assigned those properties. For example, it makes it coherent to ask the question of how do one knows whether her and another subject have the same color experience. There is a (philosophical) need of establishing a core that remains more or less the same so it would enable communication. In the case of REC, as discussed before, there is nothing other than the dynamic patterns of interaction in explaining

cognition, including phenomenality, even though it is possible that those patterns are, for at least some limited cases or aspects of phenomenality, fully brain-bounded.

REC proponents, in fact, take experience to be strictly identical to those interactive, organism-involving patterns. Note that the strict identity of experience is not with brain states only, as the older identity-theory held. It is instead an embodied identity theory, in which experiences are identical to bodily patterns. According to this idea, what is needed to explain away explanatory gaps is why we should believe that identity, and not why not the identity holds. The difference between usual identities and psychophysical identities is that experience can be lived in, "encountered in" different ways: "it can be enacted, or embodied, by the subject of the experience, but it can also be encountered objectively, for example, when it is observed by another subject" (Myin and Zahnoun, 2018). One of the baffling issues of problem of phenomenality is that brain and phenomenal properties are nothing alike. According to Myin and Zahnoun, an embodied identity theory that identifies experience and bodily patterns would fare better in explaining the explanatory gap. Particular bodily experiences and organismic activities are perspectival, subjective and affect-laden and would, then, be of a better fit for identity (Myin and Zahnoun, 2018).

As to the supposedly objective part of the identity, it takes the further acknowledgment that one descriptive, neutral or objective stance is also an experience. As indicated before, an objective description does not give a fully transparent access to the properties of the phenomena. This is especially so when the very notion of experience and its varieties are at issue. REC proponents embrace that experience can be enacted through different means, such as in a lived, first-hand experience or in a descriptive or third-hand observation way, which make them still limited in providing insight and that, definitely, do not provide the transparent descriptions that is sometimes expected.

It is also possible, within that perspective, to dismiss the multiple realization argument, as discussed before, the standard objection to identity theories. To recall, multiple realization arguments object to identity theories in terms of the possibility of mental types being realized in different physical substracts. So, pain is a mental type that can be multiply realized in diverse systems, instead of the activation of C-fibers, which is specific of the human brain. However, as Myin and Zahnoun argue, "the idea that one and the same type can actually be shared by different creatures is (...) the expression of a specific metaphysical assumption, namely the assumption that the occurrence of a certain mental event needs to be ontologically understood in relation to types" (Myin and Zahnoun, 2018). In the view they present, types should not be reified as individual things on their own, in a non-spatiotemporal

existence. Types would be better thought of as the categories accepted by a certain community and structured by specific needs to answer to specific purposes.

So, REC emphasizes the importance of setting realistic expectations concerning explanations of phenomenality. The standard goal of providing systematic and intelligible connections between first-person and third-person data, that is, phenomenal and physical processes, is, in fact, unreachable and arises from misleading assumptions. In sum, hard problems could be avoided by recognizing the distinctive epistemological aspects of different modes of experience, through first, personal and embodied forms or third-person, oriented towards objectivity but never fully neutral stances.

4.2 Thinking about experience

I am aware that the position described above might not be completely satisfactory, even for those who are open to enactivist considerations. In addition to requiring some deep reconceivings of many and diverse issues in an active and effortful way, it still can leave room for the same questions to arise over and over again. In this section I will briefly discuss how the stubborn and obsessive reappearance of hard problems can have its origins in the standard ways experience and cognitive activities are conceived. Dualistic intuitions, such as the idea that it is not possible to explain consciousness in physical terms, seem to be very widespread, but there are some reasons to consider them not to be as universal or immediate as thought. For example, Chalmers claims that "it is easy to get ordinary people to express puzzlement about how consciousness could be explained in terms of brain processes, and there is a significant body of psychological data on the 'intuitive dualist's judgments of both children and adults'" (Chalmers, 2018, p. 7). However those dualistic intuitions are, in line with an enactivist take, not actually natural, but rather a result of the development of the content-involving, later arriving activities that REC proposes.

Perhaps less influentially, some researchers have emphasized the more conventional aspects of our cognitive lives, and how those derive from aspects such as involvement in cultural practices. The very conception of mentality might be a result of inherited cultural practices. Eliminativists, for example, who have been skeptical of the adequacy of folk psychology as an empirical theory, have emphasized how introspective

judgments can be false, or at least, that they do not show any special transparency or accessibility status of the subject. For example, it can be

> just an instance of an acquired habit of conceptual response to one's internal states, and the integrity of any particular response is always contingent on the integrity of the acquired conceptual framework (theory) in which the response is framed. Accordingly, one's introspective certainty that one's mind is the seat of beliefs and desires may be as badly misplaced as was the classical man's visual certainty that the star-flecked sphere of the heavens turns daily (Churchland, 1981, p. 70).

Churchland argues that a wide variety of cognitive aspects such as mental illnesses, dreams, memory, learning and, importantly, consciousness, are either not adequately addressed or even completely ignored by folk psychology. Material eliminativists, such as Churchland, claims that the folk psychology that is spelled out in terms of intentional realism is wrong because it is not vindicated within a (completed) neuroscience. Even so, he argues that it is possible for a better folk psychology theory to be developed, in terms of neuroscience. But that is precisely one of the problematic issues: to assume that psychological categories are in need to be vindicated by strict natural sciences to be legitimate. The enactivist take is that sociocultural, collective and shared practices

> introduce something genuinely new and qualitatively distinct into the cognitive mix. Through their acquaintance with culture, some cognitive creatures acquire the capacity to think about the world in wholly new ways. Through mastering what are them novel practices, they become capable of new forms of thinking of a unique kind (Hutto and Myin, 2017, p. 138).

Social collective forms of collaboration provide a stabilization through collaborative practices that yield in ways that make the organism's engagement with their environment distinct. As it was indicated before, REC's rejection of representational views for cognition is dependent on the acknowledgment that intentional representation, that is, the capacity of referring to aspects and of thinking about the world in truth-functional ways, is *one* sort of cognitive capacity, and as fruitful and impressive it is, it is not a biologically basic activity, but rather it flourishes in the presence of the adequate conditions. Again, human experience is impressively rich, but some of its features "belong only to enculturated, scaffolded minds that are built atop of them" (Hutto and Myin, 2013, p. ix). And fundamentally, despite its complexity, there is nothing non-naturalistic about such a story.

It is quite possible that the more traditional ways in which we are compelled to think about our own experiences bring in and actually create the very problems we struggle to understand. In fact, there are reasons that suggest that some cognitive capacities can be significantly misunderstood when framed in representational terms. For example, the usual formulation of the hard problem of conscious experience is in terms of special properties that

experiences possess. For example, the usual talk and reflection of the "redness of red" and expressions alike already shows the reification processes I would like to call attention to. As pointed out by some enactivists, in their ordinary daily life, people do not normally talk about those abstract properties. They seem to only arise in some specific, philosophical contexts. The usual way according to which the question is formulated encourages a "reification of properties of experiences, in an "act-object" view of perceptual experience" (Godfrey-Smith, 2019).

Not attending to this leads us to feeding the tendency of reification, that is, the tendency "to take a characteristic of an ongoing process for the source of that process (van Dijk, 2016, p. 994). Scientific/cognitive psychology is deeply committed to reification as the ontological structure of cognitive processes. Reification empties the dynamical aspects of cognitive processes and activities by abstracting properties that are then posited as the real causal responsibles of the cognitive capacity at issue, and taken to be a pre-existing source of that process. The overall process of reification can be described in three steps: abstraction, inversion and causation (van Dijk, 2016, p. 995). In the step of abstraction, it is possible to abstract form a variety of experiences, a common feature that underlines all of them. Abstraction, obviously, is not necessarily a problem. In fact, abstraction is an important cognitive capacity. The important point is to avoid granting the abstracted properties "any metaphysical significance beyond what they help describe and bring forth (van Dijk, 2016, p. 995). Then, in the next step, the relation of "the ongoing concrete situations that showed this feature and the feature itself is inverted" (p. 995): "the abstract property is taken to be (…) ontologically prior to any behavioral manifestation and, therefore, prior to any human activity" (van Dijk, 2016, p. 995). Finally, that feature is taken to be not only as an ontologically more basic property, but in fact, as the causal source of the cognitive behavior or capacity. The famous motto of enactivists' "laying down a path in walking" illustrates the issue:

> a beaten track, say through a grassy field, is carved out of the surroundings as people walk. But in thus laying down the path, the path is a continuous outcome that also constrains other people's walking. It would be an obvious mistake to conceptualize the path as a *pre-existing* thing that causes people to walk there (van Dijk, 2016, p. 995, author's emphasis).

Representationalism in general is faulty in this very same way: "an attempt to break with representationalism (...) requires a break with [the] ontological commitment to look for explanation beyond human involvement and the dynamics of each particular situation" (van Dijk, 2016, p. 993). This results then in the establishment of a misleading

account of cognitive capacities, in which those internal entities turn to have explanatory roles. Psychological behaviorist Skinner (1977) puts the issue as, due to the complexity and multitude of experiences, the behavior that is the real cause of cognitive life is very hard to be observed: “because controlling circumstances which lie in an organism’s history of reinforcement are obscure, the mental surrogate gets its chance.” (Skinner, 1977, p. 4). That is not only damaging for cognitive science itself, but also for the understanding of experience in general, because it takes for granted the idea that there is an underlying independent structure that can be isolated from the dynamical and unique flow of practices and behaviors. In fact, as discussed earlier, the reification processes distorts the cognitive capacities at issue, in an attempt to disembody it.

5. FINAL REMARKS

This thesis had the aim of approaching the debate about consciousness and phenomenality in a way that tries to avoid the problems associated with the traditional debate in which materialist and dualist theories both face insuperable shortcomings. It has been argued that a radically enactive approach is a productive venue for leaving some stalemates behind. Chapter 1 provided an initial framework of the origins of enactivism and how it should be understood. As I take it, the main lesson from radical enactivist approaches is that there is nothing over and above the patterns of interactions with which an organism engages to the world through its body. I hope to have shown how Enactivism can be understood in thoroughly naturalistic terms in the relevant ontological and methodological senses. All elements involved in cognition are natural processes understood in a metaphysically monist inventory which needs to be, nevertheless, addressed by a variety of interdisciplinary pluralistic scientific efforts, for there is no epistemologically absolute and privileged method. Basic, contentless and nonrepresentational activities are transformed by the arising of public and social practices, in what allows for content-involving cognition, but it is a "special achievement" (Hutto and Myin, 2017, p. 90), notably exhibited by humans. The paradigmatic cognitive ability of linguistic judgment in terms of truth conditions is such an achievement. This kind of contentful cognition depends on the "development, maintenance and stabilization of practices involving the use of public artifacts" (Hutto and Myin, 2017, p. 145). In a nutshell, content is not a naturally basic notion, that is, "it doesn't exist independently from and prior to the existence of certain social practices" (Hutto and Myin, 2017, p. xv). Accordingly, it is unlikely that the story can be told as a linear unfolding. It is a very complex story to tell, but it should be in principle possible to offer a REC account for any of the cognitive capacities living beings perform. In an enactivist view, one key aspect to explain mentality lies in the diverse and flexible naturalistic resources. Whereas explanatory

naturalism "seek[s] to naturalize content by using only the resources of the hard, natural sciences (causation, informational covariance, biological functionality) and nothing more" (Hutto and Myin, 2017, p. 125), that is, a restricted naturalism, a *relaxed* naturalism should be pursued instead. Not only Cognitive Neuroscience, Biology and Physics, but also, other disciplines such as Cognitive Archaeology, Anthropology and Developmental Psychology, have an important role to play in understanding content and its natural origins. Thus, with the appeal to those resources, it would be "possible, in principle, to explain the origins of content-involving cognition in a scientifically respectable" (Hutto and Myin, 2017, p. 122) in a way that does not give rise to gaps and hard problems.

Despite the initial strangeness thinking about the environment, the body and its cultural and biological history as materially constituting cognition might generate, what should be clear is that there is absolutely nothing magical, mysterious, mystical, supernatural or in principle unexplainable within the (radical) enactivist view. Chapter 2 argued that the projects of naturalization of mental phenomena in terms of informational representation are limited, and need to be complemented by resources other than the ones strict naturalism offers. Chapter 3 discussed the principled challenges that have been repeatedly stated by philosophers, when they argue that the resources it uses to explain mental phenomena go way beyond the discovery of the mechanical parts that constitutes its machinery. However, those very philosophers also sometimes make the mistake of assuming that the shortcomings of reductive materialism entail some sort of dualism. Chapter 3 then provided reasons to relax the explanatory demands of a full reduction from psychology to a more basic science since, because as other scientific fields show, those sorts of reduction are practically nonexistent. This fact, however, does not turn scientific categories, for example, biological ones, into illegitimate scientific categories. Furthermore, that conclusion, does not preclude the possibility of achieving real and relevant knowledge about cognitive activities. In addition to the problems of implicit reductionism in research about mind, the way experience is addressed is also a significant source of problems. Chapter 4 argued that "natural" views of experience are usually laden with unquestioned commitments, that most often are the commitments of the mainstream views of mind, which presuppose that cognition can be understood as disembodied. Instead of asking "why and how physical processes in the brain give rise to conscious experience?" (Chalmers, 2018, p. 6), what should be asked is actually why do we think of the problem of consciousness as being hard.

By questioning the fundamental notions of mental content and representation in an explanation of cognition, a different way of conceiving it is promoted, having as the

starting point basic non-representational activities performed by the organism in its dynamical relations to the environment. Explaining cognitive phenomena depends on explaining how an embodied organism, who has as ontogenetic and phylogenetic history, systematically interacts with the environment in ways that are, sometimes, transformed by the establishment of cultural and social practices. If REC turns out to be correct, it might indeed be the case of a revolutionary change in the sense that key commitments concerning representationalism in Cognitive Science research need to be deeply revised. That, of course, is still a matter of debate concerning not only empirical but also philosophical aspects for, as we have seen, despite well-known difficulties, the standard representationalist views are still at play in many ways in the debate. It is not completely clear to what extent cognitive sciences are actually on the imminence of a "scientific revolution", but there seems to be sufficient reasons to consider the contributions of what are, as REC at the moment, still alternative approaches.

Enactivist approaches are arguably transformative of Cognitive Science research landscape because they are able to provide a middle way between "a disembodied eye looking objectively" and a kind of "subjectivism in which the mind on its own 'constructs' the world" (Varela et al., 1991, p. 4). It is possible that there is a fundamental circularity in human experience that prevents the possibility of a "view of nowhere". Varela et al. (1991) also emphasize that precisely the attempt to achieve such a neutral standpoint is what "leads to having a view from a very specific, theoretically confined, preconceptually entrapped" view (Varela et al., 1991, p. 27). However, it is not the case that experience is entirely physically unconstrained, depending solely on cultural matters, as a strong form of relativism would claim.

It is important to keep in mind that both cognition and experience is dynamic and has biological roots that need to be acknowledged as fundamental for the understanding of it. These aspects are commonly understood as a "stumbling block, an error or an explanatory residue" (Maturana and Varela, 1987, p. 27) that can be eradicated or abstracted away. However, as Maturana and Varela (1987) remind us, the structural coupling between organisms and environment is, instead of an obstacle, in fact, the very key to understanding life and cognition.

6. REFERENCES

ADAMS, Frederick. 2003. The informational turn in philosophy. **Minds and Machines** 13: 471-503.

BARRETT, Louise. 2019. Enactivism, pragmatism…behaviorism? **Philosophical Studies** 176 (3): 807-818.

BARWISE, Jon; PERRY, John. 1983. **Situations and attitudes**. Cambridge, MA: MIT Press.

BECHTEL, William. 1987. Connectionism and the philosophy of mind: an overview. **The Southern Journal of Philosophy (Supplement)** 26: 17-41.

BEER, Randal. 2000. Dynamical approaches to cognitive science. **Trends in Cognitive Sciences** 4(3): 91-99.

BICKLE, John. 2006. Reducing mind to molecular pathways: explicating the reductionism implicit in current cellular and molecular neuroscience. **Synthese** 151: 411-434.

BRENTANO, Franz. 1874. **Psychology from Empirical Standpoint**. English translation by A.C. Rancurello & D.B. Terrell, and L.L. McAlister. London: Routledge, 1973.

BROOKS, Rodney. 1991. Intelligence without representation. **Artificial Intelligence** 47: 139-159.

CALLEBAUT, Werner. 1993. **Taking the naturalistic turn, or how real philosophy of science is done**. Chicago: University of Chicago Press.

CALVO, Paco. 2016. The philosophy of plant neurobiology: a manifesto. **Synthese** 193 (5): 1323-1343.

CARNAP, Rudolf. 2002. Psychology in physical language (excerpt) (originally published in 1932). In: Chalmers, D. (ed.). **Philosophy of Mind – Classical and contemporary readings**, pp. 39-44, New York: Oxford University Press.

CARNAP, Rudolf. 1949. Truth and confirmation. In: Feigl, H.; Sellars, W. (eds.): **Readings in philosophical analysis**, pp. 119-127, Appleton: Century-Crofts.

CASH, Mason. 2008. The normativity problem: evolution and naturalized semantics. **The Journal of Mind and Behavior** 29(1/2): 99-138.

CAT, Jordi. 2017. The Unity of Science. In: Zalta, E. (ed.), Stanford Encyclopedia of Philosophy (Fall2017 Edition) <https://plato.stanford.edu/archives/fall2017/entries/scientific-unity/>

CHALMERS, David. 1996. **The conscious mind: in search of a fundamental theory**. New York: Oxford University Press.

CHALMERS, David. 2002. Consciousness and its place in nature. In: Chalmers, D. (ed.). **Philosophy of Mind – Classical and contemporary readings**, pp. 247-272.

CHALMERS, David. 2018. The meta-problem of consciousness. **Journal of Consciousness Studies** 25 (9-10): 6-61.

CHEMERO, Anthony. 2015. **Radical Embodied Cognitive Science**. Cambridge, MA: MIT Press.

CHEMERO, Anthony; SILBERSTEIN, Michael. 2008. After the philosophy of mind: replacing scholasticism with science. **Philosophy of Science** 75: 1-27.

CHOMSKY, Noam. 1959. A review of B.F. Skinner's Verbal Behavior. **Language** 35(1): 26-58.

CHURCHLAND, Paul. 1981. Eliminative materialism and the propositional attitudes. **The Journal of Philosophy** 78(2): 67-90.

CLARK, Andy. 2008. Pressing the flesh: a tension in the study of the embodied, embedded Mind? **Philosophy and Phenomenlogical Research** (76):37-59.

CLARK, Andy. 2008. **Supersizing the mind: embodiment, action and cognitive extension.** New York: Oxford University Press.

CLARK, Andy. 2015. Predicting peace: the end of the representation wars. In: Metzinger, T.; Windt, J. (eds.), **Open MIND**, pp. 1-7.

CLARK, Andy. 2016. Whatever next? Predictive brains, situated agents and the future of cognitive science. **Behavioral and Brain Sciences** 36(3): 181-204.

CLARK, Andy; TORIBIO, Josefa. 1994. Doing without representing. **Synthese** 101(3):401-431.

CRICK, Francis. 1994. **The astonishing hypothesis**. New York: Charles Scribner's Sons.

DARDEN, Lindley. 2005. Relations Among Fields: Mendelian, Cytological and Molecular Mechanisms. **Studies in History and Philosophy of Biological and Biomedical Sciences** 36: 349–371.

DENNETT, Daniel. 1984. Cognitive wheels: the frame problem of AI. In: Hookway, C. (ed.), **Minds, Machines and Evolutions**. Cambridge: Cambridge University Press.

DENNETT, Daniel. 1991. Quining qualia. In: Goldman, A. (ed.) **Readings in Philosophy and Cognitive Science** pp. 381-414, Cambridge, MA: MIT Press.

DE JESUS, Paulo. 2016. From enactive phenomenology to biosemiotic enactivism. **Adaptive Behavior** 24(2): 130-146.

DI PAOLO, Ezequiel; CUFFARI, Elena; DE JAEGHER, Hanne. 2018. **Linguistic bodies: the continuity between life and language**. Cambridge, MA: MIT Press.

DRETSKE, Fred. 1980. The intentionality of cognitive states. **The Midwest Studies in Philosophy** 5(1): 281-294.

DRETSKE, Fred. 1981. **Knowledge and the flow of information**. Cambridge, MA: MIT Press.

DREYFUS, Hubert. 1972. **What computers still can't do**. Cambridge, MA: MIT Press.

DREYFUS, Hubert. 2007. Why Heideggerian AI failed and how fixing it would require making it more Heideggerian. **Philosophical Psychology** 20(2): 247-268.

FEIGL, Herbert. 2002. The "mental" and the "physical". In: Chalmers, D. (ed.) **Philosophy of mind – classical and contemporary readings**. New York: Oxford University Press, pp. 68-72.

FLORIDI, Luciano. 2004. Problems in the philosophy of information. **Metaphilosophy** 35(4): 554-582.

FLORIDI, Luciano. 2015. Semantic conceptions of information. In: Edward N. Zalta (ed.), The Stanford Encyclopedia of Philosophy (Spring 2019 Edition) URL = <https://plato.stanford.edu/archives/spr2019/entries/information-semantic/>

FODOR, Jerry. 1974. Special sciences (or: the disunity of science as a working hypothesis). **Synthesis** 28(20): 97-115.

FODOR, Jerry. 1975. **The language of thought**. Cambridge, MA: Harvard University Press.

FODOR, Jerry. 1983. **The modularity of mind**. Cambridge, MA: MIT Press.

FODOR, Jerry. 1985. Précis of The Modularity of Mind. **Behavior and Brain Sciences** 8(1): 1-5.

FODOR, Jerry. 1987. **Psychosemantics.** Cambridge, MA: MIT Press.

FODOR, Jerry. 1990. **A theory of content and other essays**. Cambridge, MA: MIT Press.

FODOR, Jerry, 1994. **The Elm and the Expert.** Cambridge, MA: MIT Press.

FODOR, Jerry; PYLYSHYN, Zenon. 1988. Connectionism and cognitive architecture. **Cognition** 28(1-2):3-71.

FRISTON, Karl. 2009. The free-energy principle: a rough guide to the brain? **Trends in Cognitive Sciences**. 13(7): 293-301.

GALLAGHER, Shaun. 2018. A well-trodden path: from phenomenology to enactivism. **Filosofisk Supplement** 3. Available at <http://www.ummoss.org/gall18path.pdf> (last access: July 7th, 2019).

GIBSON, James. 1979. **The ecological approach to visual perception**. Hillsdale, NJ: Lawrence Erlbaum.

GLADZIEJEWSKI, Pawel. 2016. Predictive coding and representationalism. **Synthese** 193: 559-582.

GODFREY-SMITH, Peter. 2004. On folk psychology and mental representation. In: Clapin, H., Staines, P. and Slezak, P. (eds.) **Representation in mind: new approaches to mental representation** Elsevier.

GODFREY-SMITH, Peter. 2006. The strategy of model-based science. **Biology and Philosophy** 21(5): 725-740.

GODFREY-SMITH, Peter. 2019. Evolving across the explanatory gap. **Philosophy, Theory and Practice in Biology** 11(1). Available at: < http://dx.doi.org/10.3998/ptpbio.16039257.0011.001> (last access August 27th, 2019)

HAUGELAND, John. 1990. The intentionality All-Stars. **Philosophical Perspectives** 4: 383-427.

HEIDEGGER, Martin. 1962. **Being and time**. Translated by J. Macquarie and E. Robinson. New York: Harper and Row.

HEMPEL, Carl. 1980. The logical analysis of psychology (originally published in 1935). In: Block, N. (ed.) **Readings in the philosophy of psychology vol. 1**. Cambridge, MA: Harvard University Press, pp. 14-23.

HERAS-ESCRIBANO, Manuel. 2019. Pragmatism, enactivism and ecological psychology: towards a unified approach to post-cognitivism. **Synthese** (Special Issue: Radical views on cognition). Available at: <https://doi.org/10.1007/s11229-019-02111-1> (last access July 29th, 2019)

HORST, Steven. 2009. Naturalisms in philosophy of mind. **Philosophy Compass** 4(1), pp. 219-254.

HORST, Steven. 2007. **Beyond reduction: philosophy of mind and post-reductionist philosophy of science.** Oxford: Oxford University Press.

HOWHY, Jacob. 2014. The self-evidencing brain. **Noûs** 50(2): 259-285.

HURLEY, Susan. 2001. Perception and action: alternative views. **Synthese** 129: 3-40.

HUTTO, Daniel. 2006. Turning hard problems on their heads. **Phenomenology and the Cognitive Sciences,** 5: 75-88.

HUTTO, Daniel. 2017. REC: Revolution effected by clarification. **Topoi** 36: 377-391.

HUTTO, Daniel. Forthcoming. Relaxed naturalism: a liberating philosophy of nature. Available at: https://www.academia.edu/41195414/Relaxed_Naturalism_A_Liberating_Philosophy_of_Nature (last access April 4th, 2020)

HUTTO, Daniel; MYIN, Erik. 2013. **Radicalizing enactivism – basic minds without content**. Cambridge, MA: MIT Press.

HUTTO, Daniel; MYIN, Erik. 2017. **Evolving enactivism – basic minds meet content**. Cambridge, MA: MIT Press.

HUTTO, Daniel; MYIN, Erik. 2018. Much ado about nothing? Why going non-semantic is not merely semantics. **Philosophical Explorations** 21(2):187-203.

HUTTO, Daniel; SATNE, Glenda. 2015. The natural origins of content. **Philosophia** 43(3): 505-519.

JACKSON, Frank. 1982. Epiphenomenal qualia. **Philosophical Quarterly** 32: 127-136.

JACKSON, Frank. 1986. What Mary didn't know. **The Journal of Philosophy** 83(5): 291-295.

KRIEGEL, Uriah. 2013. The Philosophy of Mind: Current and perennial controversies. In: Kriegel, U. (ed.) **Current controversies in Philosophy of Mind**

KRIPKE, Saul. 1979. **Naming and necessity**. Cambridge, MA: Harvard University Press.

KUHN, Thomas. 1962. **The structure of scientific revolutions**. Chicago: University of Chicago Press.

LEVINE, Joseph. 1983. Materialism and qualia: the explanatory gap. **Philosophical Quarterly** v. 64, pp. 354-361.

LYCAN, William. 2009. Giving dualism its due. **Australasian Journal of Philosophy** 87(4): pp. 551-563.

MATURANA, Humberto; VARELA, Francisco. 1987. **The tree of knowledge**. Boston: New Science Library.

MCCULLOCH, Warren; PITTS, Walter. 1943. A logical calculus of the ideas immanent in nervous activity. **Bulletin of Mathematical Biophysics** 5: 115-133.

MERLEAU-PONTY, Maurice. 1964. **The primacy of perception**. Translated by J. M. Edie. Evanston: Northwestern University Press.

MILLIKAN, Ruth. 1984. **Language, thought and other biological categories**. Cambridge, MA: MIT Press.

MILKOWSKI, Marcin. 2015. The hard problem of content: solved (long ago). **Studies in Logic, Grammar and Rhetoric** 41(54): 73-88.

MULLER, Hans. 2014. Naturalism and Intentionality. In: Bashour, B.; Muller, H. (eds.) **Contemporary Philosophical Naturalism and its implications**. New York: Routledge, pp. 155-181.

MYIN, Erik. 2016. Perception as something we do. **Journal of Consciousness Studies** 23(5-6): 80-104.

MYIN, Erik; HUTTO, Daniel. 2015. REC: Just radical enough. **Studies in Logic, Grammar and Rhetoric** 41(54): 61-71.

MYIN, Erik; ZAHNOUN, Farid. 2018. Reincarnating the identity theory. **Frontiers in Psychology** 9: 2044.

NAGEL, Thomas. 1974. What is it like to be a bat. **Philosophical Review** 83: 435-450.

NAGEL, Thomas. 1993. What is the mind-body problem? In: Bock, G. & Marsh, J. **Experimental and theoretical studies of consciousness** (Ciba Foundation Symposium) 174, pp. 174-181.

NASCIMENTO, Laura; MYIN, Erik. 2017. No strength from weakness. **Constructivist Foundations** 13: 126-128.

NEWEN, Albert; DE BRUIN, Leon; GALLAGHER, Shaun. 2018. **The Oxford Handbook of 4E Cognition**. New York: Oxford University Press.

NOË, Alva. 2004. **Action and perception**. Cambridge, MA: MIT Press.

NOË, Alva. 2009. **Out of our heads – why you are not your brain and other lesson from the Biology of consciousness**. New York: Hill and Wang.

NOË, Alva. 2012. **The varieties of presence**. Cambridge, MA: Harvard University Press.

O'BRIEN, Gerard; OPIE, Jon. 2004. Notes toward a structuralist theory of mental representation. In: CLAPIN, H.; STAINES, P. and SLEZAK, P. (eds.) **Representation in mind: new approaches to mental representation** (1), pp. 1-20.

O'REGAN, Kevin; NOË, Alva. 2001. A sensorimotor account of vision and visual consciousness. **Behavioral and Brain Sciences** 24:939-1031.

OPPENHEIM, Paul; PUTNAM, Hilary. 1958. Unity of science as a working hypothesis. **Minnesotta Studies in the Philosophy of Science**. 2: 3-36.

PAPINEAU, David. 2002. **Thinking about consciousness**. New York: Oxford University Press.

PAPINEAU, David; MACDONALD, Graham. 2004. **Teleosemantics: New philosophical essays**. Oxford: Oxford University Press.

PEIRCE, Charles. 1955. Logic as Semiotic: the theory of signs. In: Buchler, J. (ed.) **Philosophical writings of Peirce,** New York: Dover Publications.

PITT, David. 2020. Mental Representation In: Zalta, E. (ed.), The Stanford Encyclopedia of Philosophy (Spring 2020 Edition, forthcoming) URL = <https://plato.stanford.edu/archives/spr2020/entries/mental-representation

PLACE, Ullin. 2002. Is consciousness a brain process? (originally published in 1956) In: Chalmers, D. (ed.). **Philosophy of Mind – Classical and contemporary readings.** New York: Oxford University Press, pp. 55-59.

PRINZ, Jesse. 2006. Putting the brakes on enactive perception. **Psyche** (12)1:1-19.

PUTNAM, Hilary. 1980. The nature of mental states. In: Block, N. (ed.) **Readings in the philosophy of psychology vol. 1**. Cambridge, MA: Harvard University Press, pp. 223-231.

RAMSEY, William. 2007. **Representation reconsidered**. Cambridge, UK: Cambridge University Press.

RAMSEY, William. 2016. Untangling two questions about mental representation. **New Ideas in Psychology** 40: 3-12.

RAMSEY, William; STICH, Stephen; GARON, Joseph. 1990. Connectionism, Eliminativism, and the future of Folk Psychology. **Philosophical Perspectives** 4: 499-533.

ROGERS, Timothy; McCLELLAND, James. 2014. Parallel Distributed Processing at 25: Further explorations in the microstructure of cognition. **Cognitive Science** 38(6): 1024-1077.

ROSFORT, René. 2013. Naturalism, ontological and methodological. In: Runehow, A.; Oviedo, L. (eds.) **Encyclopedia of Sciences and Religions**, pp. 1426-1433. Dordrecht: Springer.

SHAPIRO, Lawrence. 2011. **Embodied Cognition: New problems of philosophy**. London: Routledge.

SHANNON, Claude. 1949. A mathematical theory of communication. **Bell System Technical Journal**.

SILBERSTEIN, Michael; CHEMERO, Anthony. 2015. Extending neutral monism to the hard problem. **Journal of Conscious Studies** 22(3-4): 181-194.

SKINNER, Burrhus. 1977. Why I am not a cognitive psychologist. **Behaviorism** 5(2):1-10.

SKINNER, Burrhus. 1980. Selections from *Science and Human Behavior* (originally published in 1953). In: N. (ed.) **Readings in the philosophy of psychology vol. 1**. Cambridge, MA: Harvard University Press, pp. 37-47;

SMART, John. 2002. Sensations and brain processes (originally published in 1959). In: Chalmers, D. (ed.). **Philosophy of Mind – Classical and contemporary readings.** New York: Oxford University Press, pp. 60-68.

STEINER, Pierre. 2014. Enacting anti-representationalism. The scope and the limits of enactive critiques of representationalism. **Avant** 5(2): 43-86.

THOMPSON, Evan; PALACIOS, Adrian; VARELA, Francisco. 1992. Ways of coloring: comparative vision as a case study for cognitive science. **Behavioral and Brain Sciences** 15(1): 1-74.

THOMPSON, Evan. 2007. **Mind in Life: Biology, Phenomenology and the Sciences of Mind**. Cambridge, MA: Harvard University Press.

TOMASELLO, Michael; MOLL, Henrike. 2010. The gap is social: human shared intentionality and culture. In: Kappeler, P.; Silk, J. (eds.) **Mind the gap.** Berlin: Springer, pp. 331-349.

VAN DIJK, Ludger. 2016. Laying down a path in talking. **Philosophical Psychology** 29(7): 993-1003.

VAN GELDER, Tim. 1998. The dynamical hypothesis in cognitive science. **Behavioral and Brain Sciences** 21: 615-628.

VARELA, Francisco. 1992. Autopoiesis and a biology of intentionality. In: McMullin, B. (ed.). **Proceedings of the workshop "Autopoiesis and Perception"** Dublin: Dublin City University, pp. 4-14. Available at <https://cepa.info/1274> (last access: July 30th, 2019)

VARELA, Francisco; THOMPSON, Evan; ROSCH, Eleanor. 1991. **The embodied mind: cognitive science and human experience**. Cambridge, MA: MIT Press.

WARD, Dave; SILVERMAN, David; VILLALOBOS, Mario. 2017. Introduction: The varieties of enactivism. **Topoi** 36(3): 365-375.

WATSON, John. 1913. Psychology as a behaviorist views it. **Psychological Review** 20: 158-177.

WATSON, James; CRICK, Francis. 1953. A structure for deoxyribose nucleic acid. **Nature** 3(2): 737-738.

WILLIAMS, Daniel. 2018. Predictive Processing and the representation wars. **Minds and Machines** 28(1): 141-172.

WITTGENSTEIN, Ludwig. 1953. **Philosophical Investigations**. Basil: Blackwell.

ZAHAVI, Dan. 2005. Intentionality and experience. **Synthesis Philosophica** 40(2): 299-318.