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CLAUDIA PASSOS FERREIRA

THE DEVELOPMENT OF CONSCIOUSNESS

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Cláudia Passos Ferreira

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Tese de Doutorado apresentada ao Programa de Pós-graduação em Filosofia (PPGF) da Universidade Federal do Rio de Janeiro (UFRJ) como requisito parcial à obtenção de título de Doutor em Filosofia.

Orientador: Prof. Dr. Wilson John Pessoa Mendonça

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ABSTRACT

PASSOS-FERREIRA, Claudia. The Development of Consciousness. Rio de Janeiro, 2017. Thesis (Doctorate in Philosophy) – Programa de Pós-graduação em Filosofia, Universidade Federal do Rio de Janeiro, 2017.

The principal aim of the thesis is to develop a developmental account of conscious experience. In this account, the objective is to understand and explain the phenomenal experience of newborns and pre-linguistic infants. The question that guides the investigation concerns phenomenality of babies' experiences: what is it like to be a baby? There are some crucial philosophical issues that any account of the nature of infant consciousness must face: the ontology of early conscious states; the epistemic status of infants' experiences; the content of infants' experiences. The thesis addresses how we evolve as conscious beings, from early states of life until we become full self-conscious beings who are morally responsible for our actions.

The thesis involves four chapters. The first chapter explores phenomenal consciousness in newborns, first addressing the epistemological and methodological problems, and then arguing that newborns are phenomenally conscious and have a variety of phenomenal experiences. The second chapter addresses representation in newborns, claiming that their conscious experiences represent the world, and discussing consequences for representationalism. The third chapter focuses on the sense of agency, arguing that infants have a sense of agency and a sort of self-consciousness. The fourth chapter discusses moral agency, focusing mainly on the role of empathy.

Keywords: consciousness; phenomenality; development; representationalism; nonconceptual content; sense of agency; empathy.

RESUMO

PASSOS-FERREIRA, Claudia. O Desenvolvimento da Consciência. Rio de Janeiro, 2017. Tese (Doutorado em Filosofia) – Programa de Pós-graduação em Filosofia, Universidade Federal do Rio de Janeiro, 2017.

O objetivo principal da tese é desenvolver uma abordagem do desenvolvimento da consciência. Nesta abordagem, a finalidade é compreender e explicar a experiência fenomênica de crianças recém-nascidas e pré-linguísticas. A pergunta que orienta a investigação filosófica diz respeito à fenomenalidade das experiências dos bebês: como é ser um bebê? Existem algumas questões filosóficas cruciais que qualquer consideração sobre a natureza da consciência dos bebês deve enfrentar: a ontologia dos estados iniciais da consciência; o estatuto epistêmico das experiências dos bebês; o conteúdo das experiências das crianças. A tese investiga como evoluímos como seres conscientes, desde os primeiros estados de vida até nos tornarmos seres inteiramente autoconscientes, moralmente responsáveis por nossas ações.

A tese está dividida em quatro capítulos. O primeiro capítulo explora a consciência fenomenal em recém-nascidos, primeiro discutindo os problemas epistemológicos e metodológicos da consciência dos bebês, em seguida, defendendo a tese de que os recém-nascidos são fenomenalmente conscientes e têm uma variedade de experiências fenomenais. O segundo capítulo investiga a representação em recém-nascidos, e defende a tese de que as experiências conscientes de recém-nascidos representam o mundo, e discute as consequências dessa tese para o representacionalismo. O terceiro capítulo é dedicado ao sentido de agência, e defende que os bebês possuem um sentido de agência e um tipo de autoconsciência. O quarto capítulo discute a agência moral, com um enfoque especial no papel da empatia na moralidade.

Palavras-chave: consciência; desenvolvimento; fenomenalidade; representacionalismo; conteúdo não-conceitual; agência; empatia.

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Introduction

What is it like to be a conscious being? How can consciousness be explained? Which beings are conscious? These are important questions about the nature of consciousness and its phenomenality. These matters have been a central area of philosophical research in the last few decades[1].

Since Thomas Nagel (1974) famously asked if we can know 'what is it like to be a bat,' many philosophical ideas have been developed to understand the nature of consciousness. According to Nagel, consciousness necessarily involves phenomenality, a subjective aspect involving what it is like for a subject to have an experience. The notion of 'what it's like'[2] expresses the phenomenality of phenomenal states – there is something that it is like to be in a phenomenal state. A mental state is conscious if there is something it is like to be in that state: if there is a phenomenal quality associated with that state, such as the experience of the timbre of heard sound. A creature is conscious if there is something that it is like to be that creature. To be a conscious creature is to be capable of undergoing experiences. When we have visual or auditory sensations (as when we see green or hear a voice), or bodily sensations or emotions (as when we experience hunger or feel happy) or felt moods (as when we feel depressed or calm), distinct phenomenal experiences go along with those states.

Characterized in this way, consciousness seems to involve familiar subjective experiences we all undergo and can appreciate by introspection – the shade of blue; the sound of a bird; the smell of coffee, the taste of strawberries. However, despite our strong familiarity with those experiences, investigating conscious experiences, scientifically and philosophically, is still a big challenge.

The challenge starts with the problem of defining consciousness. 'Consciousness' is an umbrella term which designates different mental phenomena. There are a variety of cognitive

[1] For example, Nagel 1974; Jackson 1982,1986; Block 1995, 2002; Nida-Rümelin 1995; Dretske 1995; Tye 1995, 2000, 2009; Lycan 1996; Chalmers 1996, 2010; Carruthers 2000; Levine 2000; Papineau 2002; Loar 2004; Prinz 2010; and Kriegel 2015.

[2] The talk of 'what it's like' has a technical usage in the literature of consciousness, and it roughly expresses the idea that phenomenal experiences can be characterized as something it is like for someone to undergo them. For a discussion on the philosophical usage of the English term in philosophy see Snowdon (2010) and Stoljar (2016).

processes involved in consciousness, such as the ability to discriminate and process information; the ability to access internal states; the reportability of mental states; the focus of attention and the control of actions. In addition, 'consciousness' refers to phenomenality; it also involves a first-person experiential dimension, i.e., the subjectivity aspect that goes along with all those mental states. But what is the connection between cognitive abilities and phenomenality?

It is a profound philosophical question how to explain the experiential dimension involved in the performance of those cognitive abilities. Following David Chalmers (1996; 2010), this is the *hard problem of consciousness*. It is a puzzling aspect of consciousness why conscious experience arises when those cognitive processes are performed. As Chalmers points out, we can explain the performance of those cognitive processes by specifying the neural mechanisms involved in the execution of those processes, but the first-person experiential dimension cannot be explained by those neural processes. There is an *explanatory gap* (to use Joseph Levine (2000) terminology) between the neural processes and the experiential processes.

There is no consensus in how to characterize those phenomenal states. Ned Block (1995) has formulated a distinction that became widely accepted in the consciousness literature. He distinguishes between phenomenal consciousness and access consciousness. Phenomenal consciousness is experience; it is the experience of feeling pain or the sensation of seeing blue; that is, the phenomenal conscious aspect of a state is what it is like to be in that state. By contrast, access consciousness is the global availability of information for use in reasoning and rationally guiding speech and action. A conscious state is access-conscious if its content is poised to be used to direct control of thought and behavior. Block (1995; 2005) has also suggested a third form of consciousness: reflexive consciousness. Reflexive consciousness involves a conscious thought of another of the subject's conscious states; that is, it involves judgments about phenomenal states. As stated by Block, access consciousness and reflexive consciousness can occur without the presence of phenomenal consciousness, without any subjective conscious experience; and phenomenal consciousness can be dissociated from the other forms of consciousness.

Some philosophers have rejected Block's distinction between different kinds of consciousness, but they show no agreement in characterizing consciousness. They express conflicting intuitions in how to define consciousness. Some take issue with the notion of access consciousness; they claim that consciousness always exhibits phenomenality; in this case, there is

no access consciousness without phenomenality (see Prinz 2012; Montague 2016; Tye 2017). Others take issue with the idea of phenomenal consciousness; they claim that access consciousness is enough to characterize consciousness (Kouider et al. 2010; Dennett 2015). Others take issue with the idea of a reflexive consciousness dissociated from experience; they claim that the subjective character of consciousness always involves a higher-order thought (Rosenthal 1997; Carruthers 2000, 2005).

Despite the controversy, many theorists of consciousness have adopted Block's distinction. For the purpose of the thesis, I will not adopt any particular theory of consciousness. I will be mainly interested in phenomenal consciousness, the experiential dimension of consciousness. I will sometimes assume that phenomenal consciousness usually correlates with global availability for reasoning and rational guidance of behavior. However, for reasons that will become clear shortly, I will reject the idea that phenomenal consciousness always involves a higher-order-thought. I will reserve the term "consciousness" to refer to phenomenal consciousness or conscious experience. When I refer to other forms of consciousness, such as global availability, access consciousness, information integration, reportability, or reflexive consciousness, I will indicate this.

In the past two decades, there have been many advances in the science of consciousness, in areas such as perception, introspection, attention, intentionality, phenomenality, sleep, and dreams. There have also been significant advances in the philosophical theories of consciousness. However, some areas of consciousness studies are still underdeveloped. One significant gap in our knowledge of consciousness appears in areas where we cannot rely on first-person reportability of conscious experiences, as in the case of animals, infants, fetus, and certain neurological conditions (locked-in syndrome, vegetative states, etc.). The lack of first-person reports in all those cases represents a large obstacle in making scientific progress.

The topics of animal consciousness and neurological conditions have attracted much interest in the past few years. A considerable number of scientific studies on those topics have been published (Boly et al. 2013) and a new journal dedicated to the subject of animal sentience has been launched at the beginning of the last year (Harnad 2016). Recently, three leading philosophers published books on this topic – Daniel Dennett, *From Bacteria to Bach and Back. The Evolutions of Minds* (2017); Peter Godfrey-Smith *Other Minds. The Octopus, the Sea, and the Deep Origins of Consciousness* (2016); Michael Tye, *Tense Bees and Shell-Shocked Crabs.*

Are Animals Conscious? (2016). Understanding the nature of animal consciousness – what they feel, what they perceive, what they think; if they feel pain; if they feel emotions; if they grieve (King 2016) – has been contributing to shed light on some specific issues in philosophy of mind, with epistemological, metaphysical and phenomenological implications. Animal consciousness raises important philosophical questions about the nature of consciousness, including the problem of other minds and ethical issues about the welfare and moral status of sentient creatures.

However, the field of infant consciousness has attracted less attention. The philosophical literature on the topic is very small, apart from some discussion of self and self-consciousness in babies. Those are undeniably relevant topics, but they do not exhaust the subject matter. Due to intrinsic aspects of infants' conditions, infant consciousness is often perceived either as like animal consciousness (the lack of language and the lack of introspection) or as like adult consciousness (same biological neural mechanisms). However, there is a huge amount of psychological literature on infant development that has been exploring the topic of consciousness that has been orthogonal to the philosophical literature in consciousness. Three important handbooks on consciousness published in the last decade – *The Blackwell Companion to Consciousness* (2007) edited by Max Velmans and Susan Schneider; *The Cambridge Handbook of Consciousness* (2007) edited by Philip David Zelazo, Morris Moscovitch and Evan Thompson; *The Oxford Companion to Consciousness* (2009) edited by Tim Bayne, Axel Cleeremans and Patrick Wilken – include the topics of infant consciousness and development of consciousness in their list of contents. Nevertheless, in the three publications, the topics are presented by developmental psychologists, so that the subject remains restricted to psychological investigation. Developmental psychology is a field that has made huge progress in the past forty years, due to the discovery of new methodologies that allow access to infants' mental states. Numerous topics on developmental psychology have been successfully integrated to a variety of philosophical issues (e.g., morality, perception, theory of mind, concept acquisition, language acquisition, intersubjectivity, self, to mention a few), allowing for relevant contributions in those areas. Nevertheless, the philosophy of infant consciousness is still a subject to be explored.

This thesis is about infant consciousness. I aim to explore the topic focusing on the specific features that characterize infants' conscious experiences. My principal aim is to develop an account of conscious experience in human creatures considered in a diachronic perspective. I

will present an account of how we develop as conscious beings from early stages of life until we become fully self-conscious agents.

The question that will guide the investigation of the emergence of consciousness is a question about the phenomenality of infants' experiences: what is it like to be a baby? For example, how can we characterize the experience of being a newborn baby? There are some crucial philosophical issues that any account of the nature of babies' consciousness has to face: the ontology of early conscious states; the epistemic status of infants' experiences; the content of infants' experiences.

Despite the vast philosophical literature discussing the metaphysical nature of phenomenal consciousness, issues related to the ontogenetic origins of consciousness and how it develops have been much less well explored. There is relatively little research trying to investigate the nature of the early stages of consciousness, i.e., newborn and pre-linguistic babies' consciousness. What are the contents of a newborn baby's consciousness? How does a baby's consciousness relate to the external world? Do the early stages of consciousness involve self-consciousness?

Like most philosophical problems, the issues about the nature of ontogenetic origins of consciousness are potentially prone to disagreements and lack of consensus. A methodological difficulty arises from the unreportability of infants' experiences. Unlike adult conscious states that can be verbally reported and empirically tested, infants' conscious states are difficult to monitor empirically. However, in the last 30 years, there has been significant progress in empirical studies of babies' minds – how they perceive the world, how they perceive themselves, how they reason, how they understand others' minds. Many studies have been conducted in developmental psychology to distinguish the types of mental states we have in the early stages of life.

The recent advances in developmental psychology can help us to address numerous metaphysical questions about the ontogenetic origin of conscious and self-conscious experience. When and how do consciousness and self-consciousness emerge? Are we conscious at the beginning of our lives, or is consciousness something that gradually appears as the child develops? Do newborns have the required abilities to have a conscious experience? Are newborns conscious? What is the evidence for self-awareness in newborns?

These issues about the development of consciousness and its relation to self-consciousness are of strong theoretical relevance for metaphysical issues in the philosophy of mind. For example, the issue of whether newborns are self-conscious is a crucial test case for the thesis that consciousness requires self-consciousness. This thesis is itself essential for metaphysical theories of consciousness such as self-representational theories of consciousness, which hold that all consciousness constitutively involves self-representation. Similarly, the question of whether newborns have representational conscious experiences is a crucial test case for the thesis that all experiences have representational content. That thesis is itself crucial for metaphysical theories of consciousness such as representationalism, which holds that all conscious experiences have a constitutive representational structure.

Infant consciousness also raises important epistemological questions. There is a classic literature that argues for a skeptical view about our capacity to know infants' minds, and about infants' capacity to know their experiences before language acquisition (Cavell 1993). I will address both issues.

Additionally, there are important epistemological questions about infants' knowledge of their experience. Do infants know about their conscious experience? Does this knowledge require concept acquisition or the development of inner speech? If concept acquisition is not necessary, how do infants acquire information about their conscious states? A better comprehension of the role of concepts in infants' experience will help us to address these epistemological issues.

Questions about the development of consciousness also raise many moral questions. What is the role of self-consciousness in empathy and moral reasoning? Does a creature acquire moral worth at the time it first becomes conscious, and if so at what stage of human development does this happen? For example, can a fetus feel pain? Does a fetus have moral worth? Can a newborn suffer? Some philosophers have been arguing that those that are able to feel pain or to suffer are those that deserve our moral concern. Understanding the development of consciousness will help us to address these ethical questions. Research on babies' consciousness and self-consciousness have already been applied to the domain of bioethics (in fetuses and vegetative states) and developmental disorders (such as autistic disorders and self-disorders). Understanding the development of consciousness and determining the minimal state of consciousness will help us to address moral questions related to the early beginning of life. In addition, a better understanding

of developmental disorders, unity of consciousness and self-consciousness will have applications to conditions such as autism, with potential medical benefits.

The idea that pre-verbal infants and non-human animals are less conscious than adults raises many ethical questions. Our moral concerns are highly related to the potential harm our actions might cause in others. To specify how harmful our actions might be we should specify first the amount of pain or suffering it would have caused. Only conscious beings can undergo experiences of pain or suffering[3]. Some philosophers argue that creatures that are not able to feel pain or to suffer do not deserve our sympathy or moral concern. Other philosophers have been arguing for more restricted criteria: if a creature is not self-conscious, incapable of reflexive thoughts and, consequently, incapable of project oneself in a future time, it does not have moral value. The question of whether infants and animals are conscious or self-conscious is regarded by many philosophers as crucial to the question of their moral status. On this basis, Peter Singer (1993) has famously claimed that non-self-conscious infants have no more intrinsic right to live than non-human animals.[4] Since Singer is not a speciesist, it is not their species (being a human) that makes a difference in infants' moral status. However, self-consciousness is morally significant in Singer's utilitarianism. Singer (1979) makes a distinction between merely conscious beings and self-conscious beings. A self-conscious being is capable of desiring to continue living; therefore, the killing of a being with a preference for continued life is worse than the killing of a being without such preference.[5]

On the ground of those moral concerns, some people may reject a theory of consciousness whose conclusion leads to the idea that infants or animals lack phenomenal consciousness. They

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[3] For a view that pains and sufferings are possible without subjective experience see Carruthers (2004).

[4] In *Practical Ethics*, Singer claims that "Infants are sentient beings who are neither rational nor self-conscious. So if we turn to consider the infants in themselves, independently of the attitudes of their parents, since their species is not relevant to their moral status, the principles that govern the wrongness of killing non-human animals who are sentient but not rational or self-conscious must apply here too. As we saw, the most plausible arguments for attributing a right to life to a being apply only if there is some awareness of oneself as a being existing over time, or as a continuing mental self." (Singer 1993, p. 183)

[5] Here is an elucidatory passage of Singer's position: "To take the view that non-self-conscious beings are replaceable is not to say that their interests do not count. I have elsewhere argued that their interests do count. As long as a sentient being is conscious, it has an interest in experiencing as much pleasure and as little pain as possible. Sentience suffices to place a being within the sphere of equal consideration of interests; but it does not mean that the being has a personal interest in continuing to live. For a non-self-conscious being, death is the cessation of experiences, in much the same way that birth is the beginning of experiences. Death cannot be contrary to a preference for continued life, any more than birth could be in accordance with a preference for commencing life. To this extent, with non-self-conscious life, birth and death cancel each other out; whereas with self-conscious beings the fact that once self-conscious one may desire to continue living means that death inflicts a loss for which the birth of another is insufficient gain." (Singer 1979, p. 152)

may reject, e.g., higher order theories of consciousness because those theories suggest the conclusion that infants and non-human animals do not enjoy phenomenally conscious states. This conclusion tends to suggest that animals and infants lack moral status, which is contrary to moral intuitions. On this view, any reliable theory of consciousness should predict that animals and infants are conscious creatures. Theories of consciousness that lead to the opposite conclusion should be abandoned. Taking a contrary perspective, Peter Carruthers (2009) responds that denying phenomenal consciousness to infants and animals should not put them out of our moral concern. We should have moral concern for infants and animals, and living organisms in general, whether or not they lack phenomenal consciousness. Carruthers (2004) argues that sufferings can occur in the absence of phenomenal consciousness, and that sufferings that aren't phenomenally conscious can be appropriate objects of our sympathy and concern. Hence, a theory of consciousness that withholds phenomenal consciousness from infants and non-human animals do not necessarily have as consequence that their unfelt pains do not deserve our sympathy.

Even if Carruthers' argument that our moral intuitions do not threaten his higher order theory of phenomenal consciousness is correct, it does not follow that his theory is correct. I will argue that theories of consciousness that withhold phenomenal consciousness from infants (and animals) might lead us to an inaccurate picture of the nature of infant (and animal) consciousness. Those theories cannot explain many empirical findings from developmental psychology, ethology, neurosciences, and many of our folk psychology intuitions.

Investigating whether infants are conscious and self-conscious and what kind of subjective experience they undergo has significant ethical implications. Although those ethical issues won't be discussed in the thesis, exploring the topic of infant consciousness may help to clarify some positions on the ethical treatment of newborns and infants.

Infant consciousness raises similar questions as animal consciousness does, and to investigate it, we need similar interdisciplinary methods as the ones that have been applied in the field of animal consciousness. Like animal consciousness, the problem of infant consciousness lies between science and philosophy. Hence, it requires the combination of scientific methods and philosophical analysis. To address the problem of infant consciousness, I rely extensively on empirical data on the sciences of the mind, in particular on developmental psychology, cognitive

science, neuroscience, and ethology. I will engage critically with the empirical material and try to offer a philosophical interpretation of the empirical results.

However, empirical data from the sciences of the mind are not sufficient to formulate a philosophical understanding of the problem of infant consciousness. Another essential element to rely on is conceptual analysis, which consists in conceptual clarification and in formulating necessary and sufficient conditions for the concepts involved in the topic. The methodology adopted here is a pluralist one combining philosophical analysis with empirical elements.[6] In the philosophical literature, this combination of methods also falls under the name of methodological naturalism (Papineau 2015), which uses experimental findings to construct a synthetic theory supported by *a posteriori* evidence. Accordingly, this thesis adopts a broadly naturalistic approach. I will develop an empirically informed philosophical analysis, that is partially grounded in empirical data and partially in conceptual analysis. I will argue for a view that grows out of extensive cooperation between philosophy and empirical science.

In what follows, I present an overview of the thesis. The thesis is divided into four parts: (1) phenomenal consciousness (2) representation of the world; (3) sense of agency; (4) empathy and morality. By pursuing the parts in this order, I can use the current well-developed understanding of low-level aspects of consciousness as a springboard to understanding high-level aspects. Questions about higher-level aspects of conscious and self-conscious experience are made exceptionally tractable by progress on lower-level aspects.

I analyze a number of selected and specialized works, highlighting relations between different research questions as well as different research methodologies, ranging from philosophy of mind to phenomenology, to psychology and cognitive science. In choosing this integrative approach, I hope to bring to the forefront important connections between different approaches. I bring recent empirical work on the development of babies' minds together with contemporary philosophical ideas about the nature of consciousness to develop an empirically-informed philosophical account of the nature and development of consciousness and self-consciousness in infants. This philosophical analysis grounded in scientific evidence is central to my methodology.

I will now introduce each of the chapters of the thesis in more detail. The thesis is structured as follows.

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[6] For a defense of a methodological pluralism in philosophy see Dutilh Novaes (2012).

Chapter 1, *Infant Consciousness*, introduces the general discussion of the development of phenomenal consciousness and some preliminary issues that will frame the analysis on the following parts of the thesis. The chapter explores the problem of phenomenal consciousness in infants and explains the relevance of considering human consciousness in a diachronic perspective. The chapter goes over epistemological and methodological issues concerning the problem of infant consciousness and the problem of determining whether infants are conscious. The chapter explores major philosophical theories of consciousness and scientific theories of consciousness and discusses what can be concluded about infant consciousness regarding each theory. The chapter concludes by addressing some issues concerning the phenomenal structure of infants' conscious experiences.

Chapter 2, *Consciousness of The World*, focuses on the early development of consciousness, with the emphasis on representational content. The chapter addresses the question whether infants' conscious experiences represent the world and what do their experiences' representational content might be. The chapter analyzes empirical evidence that suggests that infants' perceptual states represent their environment since early stages. I argue that infant's perceptual representations are conscious and their representations satisfy the conditions for consciousness for representationalist theories of consciousness. The chapter concludes examining the implications of this thesis for externalist versions of representationalism.

Chapter 3, *Consciousness of Agency*, addresses the question whether newborn babies have experiences of agency. The chapter presents empirical data suggesting newborns have experience of agency and that they have these experiences before they develop the ability to entertain first-person conceptual thoughts. Recent data concerning agency in newborns suggest that agency experience is present at birth, but there is no evidence for first-person conceptual thought at birth. This seems to support the claim that newborns' agency experience occurs independently of the capacity for first person conceptual thoughts. I use this developmental data to reject the view that agency experience requires conceptual self-consciousness. I also investigate whether newborns have any kind of primitive self-representation, whether they represent themselves in actions as an agent, i.e., whether they have a sense of agency.

Chapter 4, *Empathy and The Development of Morality*, focuses on the moral development and moral consciousness. The crucial philosophical issue here is the problem of moral agency. This chapter explores the role of empathy in morality and understanding intentional actions, and

its relationship with moral agency. The chapter examines the development of moral emotions (particularly empathy) and moral reasoning. The chapter concludes by assessing the role of empathy and self-consciousness in the development of a moral sense and moral agency.

Chapter 1

Infant Consciousness

Are newborns conscious? We know that newborns are awake, attentive and responsive to features in the environment. Their eyes are open, they react to sounds, they jiggle their legs; they grimace, and they cry a lot. But, are they having subjective experience? If so, are their experiences like ours? Can we know what their experiences are like? If newborns are not conscious, when do conscious experiences emerge? These are fundamental questions to be answered if we aim to understand the nature of infant consciousness.

Two questions about infant consciousness are especially central. First: are infants conscious? Second: what is infants' experience like? Both questions raise important epistemological problems. How can we know whether infants are conscious? And how can we know what their consciousness is like? These problems are closely related to the traditional problem of other minds, applied to the domain of infant consciousness.

The problem of other minds is the problem of how we can justify our beliefs that others have minds like our own.[7] There is an epistemic asymmetry between the direct access I have to my own mental states and the lack of direct access in the case of other minds. I can know directly that I am in pain, but I do not have direct access to pain states of another person; I will never experience others' pain. This asymmetry generates skeptical doubts about knowledge of the inner lives of others. This problem is sharper in the case of non-human minds (animals, aliens, artificial intelligence), as Nagel (1974) pointed out in the case of bats' minds. The lack of similarities between non-humans and humans presents special difficulties for knowing about non-human minds.

[7] This epistemological problem arises because there is an asymmetry between the first-person access I have to my own mental states (experiences and beliefs) and the third-person access I have to others' mental states. I have direct knowledge of my own mental states, and indirect knowledge of others' mental states. Traditionally, three solutions have been given to the epistemological problem of other minds: 1) the inductive inference, based on the idea that the inference to other people having minds is the best explanation for the way they behave; 2) the analogical inference, based on a similarity between ourselves and others; 3) the criterial solution, based on the claim that behavior is a criterion for the presence of mental states. (see Hyslop 2016). (I discussed the asymmetry between first-person access to my own mental states and third-person access to others' mental states in Passos-Ferreira 2006; 2013.)

These problems have been in the forefront of discussions about animal consciousness, and coming to grips with the ways philosophers have finding out to solve those problems in the case of animal consciousness might help to make progress in the case of infant consciousness.

I will start by discussing the epistemological issues: how can we know whether infants are conscious, and how can we know what infants' experiences are like? Later in the chapter, I will directly address the questions of whether infants are conscious and what their experiences are like. I will try to provide some preliminary and partial answers that will be developed further in later chapters.

1.1 The Epistemological Problems of Infant Consciousness

Consciousness itself raises an epistemological problem, namely, the problem of other minds. How can we know whether anyone beside us is conscious? To come to grips with consciousness in infants, we need to clarify first why this skeptical problem arises.

According to David Chalmers (1996), skepticism about other minds is related to failures in the relationship that consciousness bears to physical facts. In some sense, consciousness supervenes naturally (empirically) on the physical, but this connection fails in the case of strong determination; physical facts fail in fully determine facts about consciousness. Chalmers characterizes this strong determination as *logical supervenience*.[8] He defines logical supervenience in terms of entailment relations: "when B-properties supervene logically on A-properties, we can say that the A-facts *entail* the B-facts, where one fact entails another if it is logically impossible for the first to hold without the second" (1996, p. 33). In the case of consciousness, the entailment relation might be formulated in this way: phenomenal property *q* supervenes logically on physical property *p*, if and only if, it is logically impossible to instantiate physical property *p* without instantiating phenomenal property *q*. This sort of logical supervenience between high-level facts and low-level facts is ubiquitous in natural phenomena (e.g., biological facts, economic facts, etc.); but it fails in the case of consciousness. Consciousness does not logically supervene on the physical. In areas where logical supervenience fails, there are accompanying epistemological problems; and in the case of

[8] A better understanding of the notion of 'logical supervenience' would require a deep discussion in the metaphysics of modality which is out of the scope of the thesis. For a clarification of the notion see Chalmers (1996).

consciousness, it raises the problem of other minds. As Chalmers points out, skepticism of other minds arises because "it seems logically compatible with all the external evidence that beings around us are conscious, and it is logically compatible that they are not." There is no external public fact (fixed by the physical facts) that we can access to avoid skeptical doubts about consciousness. Even when we know all physical facts about other creatures, we do not know whether they are conscious. The only fact we can access, in the case of consciousness, is our own first-person conscious experience. There is a fundamental epistemic asymmetry in our knowledge of consciousness: we have direct knowledge of our consciousness; but, there is no logically supervenient property that we can externally detect (from a third person perspective) in the case of other minds and other creatures that can allow us to access facts about their consciousness. So, based in our own conscious experience, we cannot rule out completely the possibility that other creatures are phenomenal zombies,[9] in the sense proposed by Chalmers (1996), which are creatures physically and functionally identical to us, but which lack conscious experience.

This skeptical scenario raises important obstacles to any attempt to explain consciousness scientifically, and this is the road to the famous *hard problem* of consciousness formulated by Chalmers (1996, 2010). Chalmers distinguishes between the hard problem and the easy problems of consciousness. The hard problem is the problem of explaining how the qualitative aspect of subjective experience arises from physical and functional processes of the mind. In contrast, the easy problems are all those phenomena that can be explained scientifically in terms of computational or neural mechanisms. As Chalmers notes, theories of consciousness have made important progress on the explanation of cognitive abilities and functions, but the explanation of experience is still a challenge. The hard problem of consciousness is how to explain experience in a non-reductive way. Any reductive explanation of consciousness in physical terms fails to explain the qualitative aspect of conscious experience. To investigate

[9] The philosophical zombie is a creature that is microphysically identical to a human being which behaves in the same way as a normal human being, but that lacks any phenomenal consciousness. From a third-person point of view, zombies look indistinguishable from any other conscious beings; however, from a first-person point of view, their conscious experiences are absent; 'there is nothing it is like to be a zombie.' From the possibility of coherently imagining the existence of creatures like zombies, Chalmers develops the 'Conceivability Argument.' In a nutshell, Chalmers' Conceivability Argument starts claiming that a scenario where creatures like zombies exist is conceivable. The conceivability of zombies is taken to imply that their metaphysical existence is possible, at least in a possible world. If it is metaphysically possible the existence of a creature that is physically identical to us but lacks consciousness, this reveals something about the nature of the mind, that is, that consciousness is nonphysical, and thus physicalism is false. (see Chalmers 1996, 2002; Kind 2011).

which creatures are conscious, we need a theory that explains how physical processes give rises to phenomenal experiences.

This general version of the problem of other minds applies to all creatures other than ourselves, including language-using adult humans. The problem of other minds becomes all the harder once one moves away from language-using adult humans: to animals, to aliens, and to infants.

The problem of knowing about infant consciousness poses a distinctive version of the problem of other minds. In one respect, it should be more straightforward than the problem of knowing about animal or alien consciousness. The experience of being a newborn is common to all humans. We have all had the experience of having been a newborn or a toddler. Because of this, we do not face the problem of knowing about experiences that we have never undergone. However, almost none of us are able to remember the experiences we had at that period – a phenomenon known as 'infantile amnesia'. The phenomenon of infantile amnesia is the inability of adults to retrieve episodic memories which are memories of specific events (times, places, associated emotions, and other contextual who, what, when, and where) before the age of two-four years. Infants cannot access their memories freely. They cannot consciously remember specific past events, differentiate them from current events and retain them for long periods. Because of this, memory of one's past life is not present from birth. If those experiences were once accessible to our consciousness, they are now inaccessible. As we are not able to form memories of those experiences we cannot know (through introspection) how similar or unlike they were to our present conscious experience. In a certain way, those experiences remain unknown for us.

On Nagel's view (1974), all forms of consciousness presuppose a subjective point of view. A creature is conscious if there is something that it is like to be that creature. To be a conscious creature is to be able to undergo experiences. Experiences are conscious states; they have 'what it's like' aspects; they have a subjective quality. All conscious beings are subjects of their own experiences. All subjective phenomena are connected to a singular point of view.

Subjectivity raises relevant epistemological issues in the case of infants. What is the epistemic status of infant subjectivity? What are the limits of knowability and understandability of facts about conscious experience in infants? Facts about conscious experience are subjective

in the sense they are understood primarily from the subject's point of view. As Nagel affirms, only creatures capable of undergoing similar experiences can understand what it is like to have that kind of experience. An outside third point of view can have just a limited and incomplete knowledge about what it is like to undergo that experience. Facts about conscious experience are epistemically limited and require a form of access from an inside point of view.

Despite being intuitively plausible, this requirement raises problems for any attempt to characterize what it is like to be a newborn. On one hand, we are creatures of the same species, ontogenetically designed and genetically programmed to develop similar conscious structures and, theoretically speaking, we might be able to undergo the same types of experience. On the other hand, the lack of language and limited communication capacities (e.g., crying, neonatal imitation, facial expressions) preclude newborns from self-reporting their own mental states. The only access we can have to newborns' conscious experience is from a third-person point of view.

Infant consciousness has often been naturally grouped with adult consciousness. However, the fact that infants lack introspection and first person verbal reports make the straightforward analogy with adult consciousness problematic and sometimes misleading. In the case of adult conscious experiences, we can rely on their ability of introspection and their verbal reports to understand facts about their conscious experience. Adults are able to know (via introspection) and to use language to communicate their private conscious experience. However, in the case of newborns conscious experience, we cannot rely on introspection or verbal reports. Newborn babies, and even young children, cannot know or tell us about their experiences.

This raises a difficulty, since introspective observation plays a central role in the context of discovering and justifying phenomenological hypothesis in the science of consciousness.[10] The experiential aspect of mental life, our phenomenology, is barely captured by scientific theories of consciousness without any input of introspective observation. First, in the case of scientific discovering, introspection has been an indispensable epistemic tool to investigate consciousness. Objective scientific observation in cognitive science often relies on scientists' introspective insights to form hypothesis and to design experimental tasks to measure consciousness. Second, introspection plays a reliable epistemic role in justifying hypothesis about consciousness.

[10] For a discussion of the role of introspection in the science of consciousness see Kriegel (2016).

Introspecting a phenomenal property is often the best evidence that the subject actually has the phenomenal property.

Although introspective observation is pervasive in cognitive science and especially in the literature on consciousness, it is difficult to apply in creatures that lack the capacity for introspection. Adult consciousness involves the capacity for introspection: adults have higher-order thoughts about their own mental states, and privileged first person access to their phenomenal states. In this context, introspective methodology may be a promising way to understanding adults' conscious experiences. Nevertheless, we cannot straightforwardly apply these ideas to examine other types of consciousness where reflexive thoughts are not clearly involved, as in the case of infants.

To know what it is like to be a newborn, we cannot rely on first-person reports. It does not follow that there are no objective methods to decide which of their states are phenomenally conscious and what kind of conscious experience they are having. However, it does follow that we must rely on third person methods (behavioral observation) that might help us to attribute mental states and subjective experience. Here we face the issue that behavioral observation alone often does not settle the question of whether certain states are conscious and what they are like.

One challenge comes from unconscious processes. Newborns display a variety of complex behaviors in reaction to the presence of different external and internal pieces of information they mentally process. Are those pieces of information processed unconsciously? When and how does a piece of information gain access to conscious processing? If so, what kind of conscious experience does this mental process trigger? Although newborns show sophisticated cognitive capacities, to empirically demonstrate conscious perception in infants is still a challenge. As we know from normal adult behaviors, there are many complex tasks that our minds can carry out unconsciously (Dehaene & Changeux 2011). Hence, it is a challenge to determine through behavioral observation exclusively whether an infant behavior indicates a conscious process affecting that behavior or whether the mental process has been carried out unconsciously.

Experimental studies have shown that there are several mental activities that adults can perform without being associated with any conscious experience. Complex perceptual process can occur without access to conscious processing (Block 2011, 2016). Bruno Breitmayer (2015) has recently described twenty-four psychophysical blinding methods that can suppress the

awareness of visual information and produce unconscious visual perception. Evidence from various unusual syndromes has also been helping to show that several unconscious processes are controlling cognition, perception and behavior. Blindsight is a good example. Blindsight is a neurological condition where some cortically blind patients show evidence of perception in their damaged field in the absence of awareness. Blindsighted patients, while reporting no awareness of a static stimulus presented in their blind field, still show some effect of it (Zelazo et al. 2007). Nevertheless, their performance on a group of visual tasks suggests that their brains have registered the presence of the stimulus. This suggests that there is visual perception in the absence of the visual phenomenology that is usually present in normally sighted patients.

For example, any adult that observes a two-month-old baby smiling at her mother would agree that it looks as if the baby is having a conscious experience. Psychologists call this "social smiling" (Rochat 2001) and they describe it as an important landmark in babies' psychological development. Parents invariably describe the emergence of social smile as the first moment they discover a person in their child. But what kind of experience is the baby undergoing? Is she recognizing her mother's face? Is she recognizing her mother's voice? Is she reciprocating with the mother? Is she reacting to human eye-contact or to a human smiling face? Is she trying to communicate with her mother? Or is it just an automatic reaction triggered by brain maturation? Those are questions that cannot be easily answered simply relying on parents' reports or mind-reading inferences either based on behavioral observation. Any attempt to generate phenomenological hypothesis based on our own introspective observation may result in unreliable knowledge funded in inaccurate projections of our own phenomenology. Other methodologies must be applied to understand infant consciousness.

We are faced with a dilemma. We cannot use first-person methods directly to investigate consciousness in infants. But third-person methods alone seem insufficient to determine whether infants are conscious. Is there an alternative?

The alternative is to combine first-person methods used on adult humans with third-person observations of infants. As with animal studies, infant studies have been making meaningful progress by combining introspective insights from adult humans with empirical observations of these creatures.

In the recent science of consciousness, scientists have combined first- and third-person methods in studying adult human consciousness. This has enabled them to build a large amount of knowledge that has been accumulated about the structure of adult phenomenology and its relationship to behavior and to the brain. In principle, we can then observe behavior in infants, and combine this with our knowledge about the connection between behavior and consciousness to generate and test hypotheses about infant phenomenology. The same goes in principle for observations of infants' brain states. Using independently established principles that connect third- and first-person observations in adults, third-person observations in babies can be used to draw conclusions about their consciousness.

In the context of scientific discovery, psychologists often use their own introspective states to justify some hypothesis about objective facts of adult phenomenology. Much research on infant consciousness has been designed for testing the presence of specific reactions that we adults would have exhibited if we had been in the same phenomenal state. If the infant reacts in a similar way that adults would have reacted, exhibiting similar behaviors we adults would have exhibited, this reaction might suggest the infant is representing the same property we adults usually represent in similar contexts, and if the property in case is a phenomenal one, e.g., a particular tactile sensation, it would be expected that the infant is having that particular phenomenal property, e.g., the infant is feeling the particular tactile sensation.

A recent example of this is Andrew Bremner's work on infant tactile sensation and spatial localization of touch (Begun Ali et al. 2015). Bremner and colleagues used tickling sensation to test if infants were able to correctly place the tactile stimulation in the external space. They use a piece of information about adults' tactile phenomenology to design the experiment. When adults cross their hands or feet and someone touches them, they often make mistakes in identifying the origin of the sensation they have felt. The source of this tactile localization deficit is because adults learn to localize tactile sensation in the external space using visual space information, such as the position of the limbs vision in the external visual space. They made the discovery by tickling the crossed and uncrossed feet of four-month-old infants with mechanically delivered vibrations. The young infants moved the foot correctly placing where they have been touched when their feet are crossed. This research shows that infants do not experience tickles and tactile stimulations in the same way as we adults do. We already knew that congenitally blind adults who lack visual information about their own bodies do not show the same tactile localization

deficit as normally sighted adults show. But Bremner's tickling reaction demonstration shows that infants' tactile sensation is less oriented by visual cues of their body position as in the case of the blind adults. This finding suggests some particular features of infants' tactile phenomenology.

As in the case of animal consciousness or alien consciousness, we can use empirical methods and theories of consciousness to understand the nature of infant's phenomenal experience and to analyze how behavior, phenomenal consciousness and brain reaction are correlated in the case of newborns.

1.2 How Can We Know Whether Infants Are Conscious?

The question of whether infants are conscious is a version of the so-called "Distribution Question" in animal consciousness studies (Allen & Bekoff 1997). The Distribution Question is the question of which animals beside humans are conscious. That is, how is consciousness distributed among members of another species? The Distribution Question is distinct from the problem of knowing other species' subjective experiences (what it is like to be another organism), as discussed by Nagel (1974). One can be justified to believe that an organism is conscious even if one cannot know what it is like to be that creature. One can be justified in believing that bats have conscious experiences of echolocation, even if one lacks the necessary mechanisms for echolocation and might never know *what it is like* to echolocate obstacles in external space. So, whether or not we can know what it is like to be another organism, it may still be possible to empirically investigate which organisms are conscious. The same goes for human infants.

The standard answer to this question has been that we infer the existence of consciousness from the behavior of the non-human animal or the human infant. However, we know that behavior is often inconclusive as a guide to consciousness. Anyone that spent some time observing, for example, groundhogs would attribute a sort of conscious mind to them, based on their natural behavior. Groundhogs are constantly alert; when someone is observing them, they seem to notice every observer's movement; they see, smell and hear an observer, and they behave accordingly to avoid contact with the observer. They seem to be constantly attentive and experiencing the environment around them. But, are they conscious? Is all the information they

perceive processed consciously? Are all those behaviors performed consciously? The same skeptical challenge appears in cases where we intuitively deny the presence of consciousness based in the absence of intelligent behaviors. The most intriguing case is the case of locked-in syndrome, in which a patient is aware but cannot move or communicate verbally due to complete paralysis of voluntary muscles in the body except for vertical eye movements and blinking. The individual is conscious and sufficiently intact cognitively to be able to communicate with eye movements, as in the case of Jean-Dominique Bauby (1997)[11] who blinked 200,000 times to "write" his memoir. A similar condition is the recent case of Martin Pistorius with a degenerative disease who was believed to be unconscious (in a vegetative state) for many years. Martin Pistorius was unconscious for several years, but then, at certain moment, his consciousness "came back" and nobody noticed. In his book *Ghost Boy* (Pistorius 2013),[12] he dramatically describes his hopeless efforts to communicate to his family and caregivers that he was "still there", that is, that he was still conscious.

One way to approach this problem is to distinguish the philosophical skeptical problem of knowing others' minds from the scientific investigation of consciousness, as John Searle suggests (1994). Searle argues that to know whether other creatures are conscious we should trust our pre-theoretical intuitions: we perceive (automatically) or infer (based on behavioral observation) that others are conscious beings. As Searle notes (1994), whenever I enter in a room full of people, I do not have to investigate (empirically or philosophically) who is conscious or not in the room. I infer that they are conscious and treat them as conscious creatures – they are awake, they behave purposefully, and they can give verbal reports of their experiences. We intuitively attribute consciousness to others, and to infants, and to a variety of animals (at least to mammals) based on the assumption that inner causal structures underlie conscious processes; that is, causal structures which are the same or similar causal structures to ours produce the same or similar effects.[13] However, our commonsense knowledge can be questioned, and it does not settle the scientific

[11] *The Diving Bell and the Butterfly* (1997) is a memoir by journalist Jean Dominique Bauby. It describes what his life is like after suffering a massive stroke that left him with locked-in syndrome.

[12] Martin Pistorius also tells his story in a TED talk.
http://www.ted.com/talks/martin_pistorius_how_my_mind_came_back_to_life_and_no_one_knew

[13] However, although common sense intuitions might be reliable in contexts of attributing psychological states to others, it does not seem a reliable solution in cases of attributing phenomenal states to others. Psychological states are direct connected to behaviors and to the effects of causal structures in a way that phenomenal states are not. Perhaps this attribution of psychological states to others might be the reasoning we use to believe that others have minds, but our intuitions do not provide any evidence for consciousness. Conscious experience is not directly observable.

problem. The question is how science can help us to find out what are the neural mechanisms underlying the causal structures of consciousness, and thereby help to settle the issue of which animals are conscious and which are not.

Jesse Prinz (2005) calls the problem of which organisms are conscious "The Who Problem" ("who is conscious?") and elaborates some partial solutions to the problem. Prinz is skeptical about any behavioral observation methods to infer consciousness; he argues that no amount of behavioral observation can help to settle the question whether other creatures are conscious or not. To know whether a creature is conscious, we must figure out whether they have the mechanisms that produce consciousness. Prinz argues that if we find out what are the mechanisms of consciousness in adult humans, we can see if infants (or any creature) already have these mechanisms. Thus, if infants have those mechanisms of consciousness, we can conclude that they are conscious.

Prinz's condition for consciousness is: a creature is conscious if she possesses the same neural mechanisms that make us (adult humans) conscious. In Prinz's model (2005, 2010), the mechanisms responsible for consciousness are the attentional mechanisms that make intermediate-level perceptual representations available to working memory.[14] The role of consciousness is to deliver information to our working memory. So, creatures that have both attention and working memory are conscious. Higher mammals have neural mechanisms like us, and probably have the attentional mechanisms too. However, when we consider creatures distant from us in the evolutionary chain, like octopuses, bees, pigeons, which have neural mechanisms quite different from ours, it is not clear whether they are conscious. For Prinz, there is no reliable analyses that help us to know how close to our neural system a very different neural system is. It is impossible to know what level of physiology is necessary for consciousness. So, it is a mystery whether those distant creatures are conscious or not. Our theories of consciousness might help us to know what are the sufficient conditions for consciousness based on facts about our brains, but we will never know what are the necessary conditions for consciousness.

On Prinz's view, there will always be "residual mysteries" about consciousness. Infant consciousness may be a residual mystery. Prinz (2012) argues that we cannot know whether

[14] Prinz's theory of consciousness is the Attentional Intermediate-Level Representations (AIR). In his model, he claims that "consciousness arises when and only when intermediate-level representations undergo changes that allow them to become available to working memory." (Prinz 2010, p. 97).

infants are conscious on the basis of behavioral observation, because it is difficult to distinguish attentional behavior from orienting behavior. Alternatively, we could search for the neural signatures of consciousness in infants. However, infant brains are still in development, the connections between areas necessaries for a global cortical network are underdeveloped, and Prinz (2012) claims that this may limit infant brains' capacity for allocating attention. On Prinz's view, infants seem to fail the neurobiology condition for consciousness, because they lack the attentional process necessary for consciousness.

Prinz's solution to the problem leaves us with a very restricted answer to the distribution problem. It would be preferable if there is a way to make some progress in the problem and avoid Prinz's skepticism.

How can we know what mechanisms are responsible for consciousness? A reply to this question requires an explanation of how consciousness and physical brain processes are causally correlated. If we find out a theory that explains how consciousness arises from physical brain processes, we might be able to answer the distribution question. However, given the variety of theories of consciousness and the current state of disagreement in the field (among philosophers and scientists), it is hard to find one single solution that could settle the problem. Even among approaches that are friendly to infant consciousness (or animal consciousness), it is hard to find out an elaboration of the problem to permit ready answers to the question of whether infants are conscious with some degree of certitude.

The best strategy so far is that of adopting inference to the best explanation. We observe regularities between consciousness and behavior or brain processes in adults, and to explain these regularities, we infer underlying principles that connect consciousness to brain and behavior. We can then identify some behavioral correlates of consciousness in infants and use the inferred principles to attribute consciousness in the presence of this behavior. The attribution of consciousness will be justified by inference to the best explanation. As Chalmers (2010) argues, there are remarkable regularities between consciousness and information processing in our own case, and we can postulate simple underlying laws connecting consciousness and information processing. There are also regularities between experience and physical or functional states in our own case, and we can postulate simple underlying laws to explain them. We can use those laws to infer the existence of consciousness in others. This may not be the reasoning that we use

in believing that others are conscious, but in any case, it seems to provide a reasonable justification for our beliefs.

One current project of the science of consciousness is to find out what the neural correlates of consciousness are (see Chalmers 2010, chapters 3 and 4). A neural correlate of consciousness is a minimal neural mechanism sufficient for any conscious perception, and it is directly associated with states of consciousness. Neural correlates of consciousness can refer to a specific content of consciousness (e.g., experiencing faces), or the overall state of consciousness (the experience of consciousness as a whole).[15] Identifying a neural correlate of consciousness involves connecting behavioral correlates of consciousness to the neural mechanisms underlying those behaviors. There has been some progress in the science of consciousness, but at the moment, there is no consensus about which neural mechanisms are responsible for consciousness in adult humans. In a recent review on the topic, Christof Koch and colleagues (2016) argues that some popular candidate for neurophysiological correlates of consciousness – namely gamma activity and the P3b wave – have proved to be illusory. They show how misleading evidence of neural correlations may be considering the huge number of causal interactions in the brain. They also suggest that no single brain area seems to be a necessary condition for being conscious but there are some brain areas that are good candidates for being signatures of consciousness, what they call "a hot zone" (Koch et al 2016). In addition, they argue that contrary to previous studies that emphasize the frontal cortex network involved in task monitoring and reporting as the anatomical neural correlates of consciousness, the hot zone they found is primarily located in a posterior cortical region that includes sensory areas. These findings have an important consequence in favoring the case of infant consciousness, as I will discuss in the next section.[16]

[15] A neural correlate of consciousness (NCC) is a minimal neural system associated with states of consciousness. The entire brain is associated with states of consciousness, but not every part of the brain correlates with conscious experience. The research on the NCC aims to identify specific areas of the brain that correlates with conscious experience. A content-specific NCC is a neural system associated with a particular content of experience whether perceived, dreamt or imagined; a full NCC is a neural system associated with experience in general, regardless of its specific content. (see Chalmers 2010; Koch et al. 2016)

[16] The frontal-parietal cortex is associated with higher-order functions (with thought-like experiences) involved in task monitoring and reporting, and with areas that are still developing in infants' brain and have restricted connectivity. The posterior cortical hot zone includes sensory areas, areas that mature first in infants and show high connectivity in the first 3 months of life.

We still need to better understand the relation between consciousness, behavior, and the neural correlates of consciousness, but we are gradually making enough progress to apply our tentative theories to the case of animal and infant consciousness.

An approach like this has been adopted in the case of animal consciousness, where the degree of theoretical incertitude is high. The research strategy is to identify specific animal traits relevant to consciousness. Those traits can be the neural mechanisms involved in consciousness, or behaviors often associated with conscious experiences, based partly on what we know about consciousness from the adult human case. Once we have identified neural mechanisms (neuroanatomical properties and neurophysiological processes) and behaviors that correlate with consciousness in humans, we can try to find them in animals and connect those observable characteristics to conscious experiences. The data from adult humans should work as a reference in comparing neuroanatomical, neurophysiological, and behavioral features observed in non-human animals to the human case.

There are some special difficulties that arise in applying this methodology in the case of infants. Regardless of lacking verbal report, it is easier to train a non-verbal animal (e.g., higher mammals, especially primates) to perform a task to obtain subjective reports than to train infants (Kouider et al. 2013). For instance, one way to study the neural correlates of conscious sensory perception in adult subjects is to present them to a psychophysical paradigm, e.g., visual masking, that contrasts visible and invisible stimuli (conscious and non-conscious stimuli), and thereby isolate the moment of the conscious stimuli (Dehaene & Changeux 2011). The invisible stimulus is a subliminal stimulus; that is, the visual information is so reduced as to make it undetectable to conscious subjects. The invisible stimulus can be achieved by a method called masking, where the conscious visibility of a stimulus is reduced by the presentation of other stimuli acting as 'masks'.[17] Monkeys can be trained to give subjective report of the presence or absence of a stimulus, in tasks involving visual masking, either by touching the location of a stimulus on a

[17] One way to experimentally test whether a stimulus is consciously experienced is to create minimal contrasts between conscious and unconscious visual processing, and to measure when a stimulus is subjectively reportable. There are several "blinding" methods for achieving subliminal or unconscious presentation of a stimulus, such as masking, binocular rivalry, inattentional blindness, to mention a few (see Dehaene & Changeux 2011; Breitmeyer 2015). In masking, the subjective visibility of a stimulus is reduced or eliminated by the presentation of other stimuli acting as 'masks,' in close spatial and temporal contiguity. In binocular rivalry, the image in one eye becomes subliminal by competition with a rivaling image presented in the other eye. Inattentional blindness is a method by which a potentially visible but unexpected stimulus remains unreported when the participants' attention is focused on another task.

screen or by pressing a key to indicate the absence of a stimulus (Kouider et al. 2013). However, it is not so easy to train newborns and infants to report about the stimuli they perceive in the same way. The abilities to press a key and touch a screen do not appear in human infants until later in their development. To address this challenge, scientists have been developing other indirect ways to have access to infant consciousness, relying on other abilities infants display earlier in development.

We can also go beyond the simple use of behavioral and neurobiological signs of consciousness by appealing to theories of consciousness. Philosophers and scientists have developed a number of theories of consciousness, based on both philosophical and empirical considerations. Many of these theories of consciousness make predictions about which systems are conscious and which are not. Various theorists have already appealed to theories to help determine whether non-human animals are conscious. In principle, these theories can be used to help determine whether infants are conscious as well.

Perhaps the best strategy is to combine evidence from behavior and neurobiology with evidence from theories of consciousness. I will explore this strategy in the next two sections.

1.3 Behavioral and Neurobiological Evidence for Infant Consciousness

There are two general approaches for determining whether infants are conscious. First, we can rely on behavioral or neurobiological signs of consciousness. These signs are based on correlations in the ordinary adult human case, and can then be applied to animals or to infants. Second, we can rely on theories of consciousness. Again, these have often been developed in the adult human case, but they can also be applied to animals and infants.

Both strategies have often been taken in the literature on animal consciousness, but they have been applied less often to infant consciousness. In this section and the next I will examine both strategies in making an initial case that infants are conscious.

In this section I will consider behavioral and neurobiological signs of consciousness, focusing especially on behavior. The most important behavioral sign of consciousness is verbal report, but this sign is unavailable for infants and non-human animals. In the case of non-human animals, several other behavioral signs are often used as evidence of consciousness, both for

consciousness in general and for specific conscious states such as pain. Mammals that share many behaviors traits with humans and have similar neuromechanisms (such as primates) have been seen as conscious creatures. In addition, they have been used in laboratories to study neural correlates of consciousness in humans. For example, monkeys act similar to humans and they have similar brain structures, and they also display similar reactions when faced with some behavioral tasks, e.g., they are able to signaling when they do not perceive a stimulus under blindsight conditions (Koch et al. 2016). The closest a mammal brain is, in evolutionary and neural terms, to human brains more consistent is the analogy with human consciousness.

My approach here will be to examine behavioral and neurobiological signs that are used in the case of non-human animals, and to apply these signs to the case of infants. I will first briefly discuss behavioral evidence for conscious states in general and will then discuss behavioral and neurobiological evidence for specific conscious states, focusing on the special case of pain.

There is no behavioral sign that is widely accepted among philosophers and neuroscientists as a criterion for consciousness which is in addition suitable for cases of non-linguistic conscious creatures. Chalmers (2010) proposes that 'global availability for behavior control' may play this role.[18] His idea is that wherever there is conscious experience, the contents of the experience correspond to contents that are made directly available for global control of the behavior in a cognitive system (Chalmers 2010, ch.4). So, if I feel pain, for example, the contents of my experience are exhibited in the control of behavior: it can cause me to cry out, to nurse my injury, to avoid the source of the noxious stimulus, to make defensive movements, and so on. In Chalmers' approach, a content is conscious if it is directly available for the control of the behavior in all sort of modalities in a cognitive system.

Chalmers' criterion for consciousness is less demanding and more plausible in the case of non-human animals and infants than many others, such as the idea of availability in a global workspace (cf. Baars 1988), or the idea of availability for higher order thoughts (cf. Carruthers 2000) (I will discuss global workspace and higher order theories in the next section). However,

[18] Chalmers's functional criteria to ascribe consciousness proceeds as follows. First we define *pre-experimental bridge principles* connecting consciousness to the information processing in the cognitive system (e.g., verbal report, global control). The idea is that when an information is directly available for verbal report, or available for global control, then it is conscious. So, a conscious information is directly available for global controlling behaviour. Then, we need empirical research to connect this functional property (direct global availability) to a specific neural process. The conclusion is that consciousness is that specific neural process that correlates with the functional criterion defined pre-experimentally (global availability), that is the mechanism of global availability.

to exclude cases of involuntary unconscious response (e.g., blindsight, where there is some availability for control but no conscious experience), Chalmers suggests restricting the criterion to availability for voluntary control of the behavior, which might be an over-demanding criterion if we consider cases of non-human animals. If voluntary action is here understood in a deflationary way, as a self-generated action that is not just an automatic reaction, the criterion might allow for cases of non-human animals. But if voluntary action is understood as in the philosophy of action tradition, requiring rational control from a rational agent, then the criterion might not allow for cases of non-human animals, at least, if we consider the whole spectrum of non-human animals.

More recently, Michael Tye (2017) has proposed flexible behavior as a general condition for consciousness. Flexible behavior is the ability to rapidly change from one course of action to another allowing a variety of responses and adjusting to novel circumstances. Tye's idea is that mental states allow for flexibility in behavior. If a stimulus is associated with not just one behavioral response but allows multiple different responses, it shows a flexible behavior response, and that is a sign that a creature is conscious of the stimulus. So, if there is no flexibility in behavior in response to a stimulus, this is evidence that no conscious mental state is operative in the production of the behavior (Tye 2017). This provides us with what Tye (2017) calls a "zombie test"[19] for living things. According to Tye, conscious experience is what enables a conscious subject to perform a certain sort of action in the actual world; if a creature cannot perform that sort of action, it is not subject of that experience. Additionally, as in Chalmers' condition, Tye's flexibility condition says that the content of a mental state must be available for action control to be phenomenally conscious. Unlike Chalmers' condition, in Tye's condition the behavior control does not need to be necessarily a voluntary control of the behavior; it just need to allow for flexibility and variability in the responses produced.

Tye uses the criterion of flexible behavior to analyze whether several species (from fish to birds, from crabs to bees) are phenomenally conscious. He applies the "zombie test" to detect zombie living things which lack phenomenal consciousness, and decide which living creatures

[19] Tye's (2017, p. 162) zombie test is a test to detect whether a living creature is a zombie, that is a thing without any consciousness. The test aims to evaluate if a creature meet a necessary condition for consciousness. Tye's way of determining a necessary condition for consciousness is to specify a general functional role played by mental states in behavior. Mental states allow for a flexible behavior. Changes in mental states often produces changes in behavior. Experiences allow for mental learning, and changes in behaviors in response to stimulus. Thus, if no flexibility in behavior is observed, this is evidence that no mental states (no experience in particular) are producing the behavior.

are conscious. Tye's verdict is optimistic. Among the species submitted to the zombie test (protozoa, plants and caterpillars), only protozoa and plants are definitely considered as lacking phenomenal consciousness. Caterpillars seem to be a borderline case, though Tye prudentially claims that there is no strong evidence of the presence of phenomenal conscious in caterpillars.

There are plenty of evidence that infants satisfy the flexibility condition. Newborns display a variety of action systems at birth, which involve flexible behaviors under the control of previous experience, capable of changing based on learning experience, and adjusting to novelty. Those behaviors vary from orienting, avoiding, sucking, rooting, to head turning; grasping objects; eye tracking (Rochat 2015). The evidence of infants' flexible behaviors will be discussed in detail in Chapter 3 when I discuss the consciousness of agency. Thus, there is good reason to hold that infants pass Tye's behavioral test for the presence of consciousness in general.

What about specific conscious states? As a case study, I will focus mainly on one sort of conscious state: the experience of pain. There is a substantial literature on whether there is pain in various non-human animals that uses behavioral as well as neurobiological signs of pain. I will review some of that literature, and then apply the same signs that are used in animals to the case of infants.

Pain is a bodily sensation often attributed to bodily locations, and often associated to some objective features such as volume, intensity, duration. The common-sense view of pain (along with other similar bodily sensations) involves a dual status: pain is a particular condition of body parts (e.g., 'My neck hurts.') and being an unpleasant subjective experience (e.g., 'It feels bad!'). The ambiguity of the conception of pain has been of main interest in philosophy, and has generated opposite intuitions:[20] 1) pain as the perception of an objective reality of the body; 2) pain as a subjective feeling, with an affective dimension. I will be mostly concerned here with the affective dimension of pain experience, namely its negative affective quality.

Pain is often considered as a paradigmatic example of conscious experience. A creature that feels pain is considered a conscious creature, a sentient being. Adult humans can identify many types of pain with a variety of qualitative experiences (shooting pain, sharp pain, stabbing pain, dull aches, cramps, pressures) associated to different intensities, durations, patterns and locations (associated with some part of the body). But pain in infants is less well understood.

[20] For an overview of the philosophical theories of pain see Aydede (2006).

Until the early 1980s, it was widely accepted that infants could not feel pain. Much of the twentieth century were characterized by skepticism toward infant pain, and infant surgery without anesthesia was routinely performed (Rodkey & Riddell 2013; Maurer & Maurer 1988; Chamberlain 1998). As recently as the 1980s, it was common for babies to be given neuromuscular blocks (e.g., curare or similar paralytic agents) but no pain relief medication during surgery and other painful medical procedures (see Chamberlain 1998; Rochat 2014). During the twentieth century, with the advance of neonatology, much experimental research on infant pain was developed that contributed to the skepticism about infant pain. These experiments used pinprick, electric shock and other methods to submit newborn to a variety of painful stimuli (e.g. hunger; being dropped two to three feet and caught; having their heads restrained with firm pressure; someone pressing on their chins for 30 seconds; being stimulated with a blunt pin at intervals; running water of different temperatures in different areas of the baby).[21] Despite clear responses to pain stimuli (crying, defensive bodily movements, local reflexes), those experimenters concluded that newborns have limited sensitivity to pain, and some suggested an early period of hypoesthesia (abnormally weak sense of pain, heat, cold, or touch) at birth. Multiple causes appear to have contributed to the denial of infant pain,[22] especially the idea that infant brain and nervous systems were still developing, so, infants' brain were not developed enough to feel pain.

In recent years, researchers' views have evolved to the point where the most common view is that newborn infants feel pain. This evolution has paralleled a similar evolution in the case of non-human animals. Earlier researchers often denied the presence of consciousness in mammals such as mice, but these days there is a strong consensus that mammals are conscious. The debate over animal consciousness has moved to simpler non-human animals such as fish, where it is increasingly common to accept that fish area conscious (see Tye 2017).[23] Some researchers are inclined to attribute pain experience even to complex invertebrates such octopuses. I will examine the case of animal pain and then apply some of the lessons to the case of infant pain.

[21] For a detailed description of those experiments see Rodkey and Riddell (2013) and Chamberlain (1998).
[22] Rodkey and Riddell (2013) review the history of 19th and early 20th century infant pain research, and suggest four interrelated causes that appear to have played a causal role in the development of infant pain skepticism. These are 1) the Darwinian view of the child as a lower being; 2) extreme experimental caution; 3) the mechanistic behaviorist perspective; and 4) an increasing emphasis on brain and nervous system development.
[23] For a contrary view see Key (2016).

How do animals experience pain? And how can we identify the experience of pain in animals? Animals similar to us, like mammals, exhibit behaviors that resemble the way we behave when in pain, which allows us to naturally infer the presence of pain. Although they cannot report their pain verbally, we can perceive when they are hurt; they show similar pain-related behaviors as humans do in similar contexts. A dog owner usually thinks she knows when her pet is in pain. But, it is disputable that we can infer pain experience from mere visual observation of behaviors. The presence of pain-related behaviors can indicate pain, but we can always ask: is the pain a conscious experience, or is it just a reflex?

Pain can be separated into two distinct processes: a sensory recognition of harm; and an affective recognition of harm. The sensory process is nociception. Nociception is the capacity to sense noxious stimuli. This is a reflexive (automatic) avoidance movement generated by motor neurons in the presence of harmful noxious stimuli. In nociceptive responses, the sensory neurons of the skin (called nociceptors) feel a harmful stimulus and they produce a signal that communicate the information to the spinal cord; in the spinal cord, motor neurons activate movements to rapid move the organism away from the threaten. The other process is the affective recognition of harm. In this process, the neurons make a second round of process that goes from the spinal cord to the brain; there, a million of neurons in multiple regions create the sensation of pain. This is the subjective feeling of pain, an unpleasant subjective felt quality. In humans, this is a well-known process that involves unpleasant and negative affect, associated with emotions of fear, panic, stress, and behaviors of crying and avoidance of the threaten stimulus. In humans, both processes (the sensory and the affective) are connected; usually, when nociceptive responses are activated, we feel the conscious experience of pain; although both processes can be dissociated to some degrees, with analgesics or in case of lesions (Allen et al 2005).

Animal studies have found nociceptive responses in all vertebrates and in a range of invertebrate animals. These animals have the neural mechanisms to react to a harmful stimulus. In the case of mammals, these neural mechanisms are quite similar to the human mechanisms. It is widely accepted among scientists the mammalian pain system has both a sensory and an affective pathway, and that both systems are connected in the same way as it is observed in human pain systems. Mammals also display similar pain-related behaviors such as awareness of threat, vocalizations, wound grooming, and reclusive behavior. Withdrawal, avoidance and

nursing behaviors in mammals strongly suggest that their pain systems are comparable to human pain system, and are used to infer that they have the capacity of consciously experiencing pain (Allen et al 2005). Additionally, there is evidence that the anatomical systems involved in the neural processes essential to human consciousness are shared among all mammals (Merker 2007; Baars & Gage 2010); which is taken to suggest that mammals are conscious.

When we consider animals that are more distant in the evolutionary chain, such as birds, fish, or invertebrate animals, their nervous systems have different architectures and the neural mechanisms and pain-related behaviors are less similar to the mammals' case. If it is the case that invertebrates are able to feel pain, this capacity must be achieved by a neural mechanism different from that found in mammals. Thus, if non-mammalian consciousness exists it relies on different neural mechanisms. At one extreme, simple invertebrates have simple nervous systems with nociception response, but without the other part of the process that suggests conscious experience. However, some other invertebrates are more complex. For instance, consider the case of octopuses discussed by Godfrey-Smith (2016a). Octopuses have a sophisticated brain and intelligent behavior; they display flexible and non-reflexive behaviors in responses to noxious stimuli. In a recent study, Alupay and colleagues (2014) showed that an injury of an arm in an octopus led to a range of wound-directed responses – such as grooming and protecting the hurt arm, sensitization, long-term decreased thresholds for escape responses, and, unusually, amputation of the arm. Octopuses seem to make value judgments around the sensory input instead of just reacting reflexively to harm; and they also show memory of the physical stimulus. As Godfrey-Smith argues (2016a, 2016b), it is hard to know with certainty if octopuses experience pain, but their wound-tending and flexible protection of injured areas is at least indicative of pain.

What about infants? In infants, we can observe similar pain behaviors and physiological reactions as in adults and in mammals. Recently, the skepticism about infant pain has been changing with new evidence of pain in newborns, premature babies, also in fetus. To investigate whether infants feel pain I will use the same strategy as those presented in animal pain studies. I will consider behavioral, neurophysiological, and anatomical evidence for conscious experience of pain. The evidence includes presence of flexible responses to bodily damage like mammals in general and, presence of specific adult humans' reactions (such as facial expressions and crying),

and evidence of similar brain regions and neural mechanisms activated in infants exposed to noxious stimuli.

In the case of behavioral evidence, recent research on infant pain has found a variety of pain behavioral and physiological reactions: altered vital signs (change of breathing pattern, increasing heart rate, blood pressure), pain crying (changes in pitch, temporal pattern and harmonic structure), facial expressions (brows bulge; eyes squeeze shut; lips purse, the mouth opens wide, the chin quivers), body movement (e.g., jerking, pulling back, trying to escape, swinging arms, use hands to push away, and scraping one leg against the other to avoid a noxious stimulus), and a range of pain-related behaviors (e.g., tremoring, spitting up, trunk arching, finger splaying, fisting, squirming, inconsolability, and restlessness) (Chamberlain 1998). Considering the analogy with the case of animal pain, the relevant signs for conscious pain are the body movements and the pain-related behaviors which indicate the ability to react with flexible response to noxious stimuli. Infants have plenty of those behaviors. Additionally, considering the analogy with adult humans, pain crying and facial expressions are also very relevant signs of feeling of pain. An adult crying or groaning with a tense face is usually taken as a behavioral evidence of feeling pain. Most of the standardized pain scales used in clinical practice rely on infants' patterns of crying and facial expressions to assess the intensity of pain in newborns (Srouji et al. 2010).

In the case of neurophysiological evidence, recent groundbreaking brain imaging studies have found that similar brain networks are activated in infants exposed to noxious stimuli as those found in adults. Rebeccah Slater and colleagues (see Goksan et al. 2015) used functional Magnetic Resonance Imaging (fMRI) to compare brain activity in adults and in infants when poked with a special retracting rod stimulating a sensation of pain. The researchers identified the network of brain regions that are active following acute noxious stimulation in newborn infants, and compared the activity to that observed in adults. They demonstrated that most of the brain regions (eighteen out of twenty regions) active in adults experiencing pain were active in newborns. The finding that the fMRI response in newborn babies occurs at lower sensory thresholds than in adults confirms the heightened sensitivity to pain in newborns that has been reported in previous studies of behavioral responses. Scans showed that infants' brains had the same response to a weak poke (of force 128mN) as adults did to a stimulus four times as strong (512mN). The findings suggest that not only do infants experience pain much like adults, but

that they also have a much lower pain threshold than adults, confirming the heightened sensitivity to pain in newborns reported in previous studies. Additionally, the study allows a relevant conclusion, as pointed by Ranger and Grunau (2016), that the experience of pain is not a learned phenomenon as suggested by some research; no prior experience of pain is necessary to produce sensory and affective responses to pain. This suggests that pain is a primitive state, that does not need to be learned or need a specific cultural environment to be acquired. Humans are designed by their evolutionary history to feel pain since very early.

Is this evidence enough to attribute pain experience to infants? A skeptic might still argue that the evidence presented (both behavioral and neurophysiological) does not show that a subjective feeling of pain plays any causal role in those reactions. They can argue that the connection between the behaviors and the mental state is nothing but a reflex (automatic) response.

In response, we can argue that inference to the best explanation supports the claim that the reaction is associated with pain. It is rational to attribute pain experience to others in the presence of this behavioral evidence. This argument can take two forms. First, if we assume that consciousness plays a causal role in behavior, we can argue that the attribution of feelings of pain to infants provides the best explanation of the evidence of pain-related behaviors and activation of same brain areas. We can appeal to the causal efficacy of pain experiences to rationally explain the pain-related behavior. Pain feels bad; negative feelings usually cause people the desire of getting rid of or avoiding a stimulus, it causes the desire that it ceases of or to move away. Thus, the presence of feelings of pain seems the best available explanation for those reactions in infants. This explanation seems to be the one Tye (2017) favors.

Second, even if we are unwilling to assume that consciousness plays a causal role in behaviors, we can argue that the best explanation of regularities connecting brain processes and consciousness suggests that flexible behavior is associated with consciousness. The evidence we have suggests that consciousness typically goes with flexible behavior and vice versa, and induction from this evidence suggests that conscious pain is present in babies. In this case, even if epiphenomenalism is true and consciousness has no causal power, and thus the experiences of pain are not causing infant behaviors, babies can still be said to be conscious, as they meet the

condition for consciousness specified earlier, i.e., the presence of flexible behavior. If so, infants pass Tye's 'zombie test,' and they have pain experiences.

A skeptic might still deny that flexible behavior is a sufficient condition for consciousness. It might still be possible to have a sort of 'flexible zombie baby,' that is, a baby that displays flexible behaviors in response to a noxious stimulus without any associated conscious feelings. As I have argued, in addition to flexible behavior, a number of behaviors in infants are similar to behaviors associated with consciousness in adults. These behaviors include the ability to detect novel stimulus (to react to novelty), the ability to react with surprise when a stimulus violates an expectation, the ability to feel bothered when facing a habituated stimulus, and the ability to respond with pleasure when an action achieves the goal. All of these are behaviors that we would not normally expect to be accomplished without consciousness. Of course, we cannot prove to a skeptic that these behaviors must be accompanied by consciousness. Still, by normal standards of evidence, these provide reasonably reliable evidence of consciousness in infants.

To make further progress on this question, it helps to bring in philosophical theories of consciousness to help to determine in general whether mental processes in babies might be conscious.

1.4 Infant Consciousness and Theories of Consciousness

There are many different theories of the relationship between consciousness and physical processes[24]. There are both scientific and metaphysical theories of the relation. For the purpose of the thesis, deep questions about the metaphysics of consciousness, such as the question of whether materialism or dualism is true, are, to a certain extent, orthogonal to the main thesis.[25]

[24] See Chalmers (2010) for a comprehensive taxonomy of the important views on the metaphysics of consciousness. The taxonomy is on chapter 5.

[25] General metaphysical theories of consciousness aim to locate consciousness in the world of physical reality. They aim to answer the ontological problem of the relationship between mind and body, or between mental properties and physical properties, that is, they aim to solve the mind-body problem. The mind-body problem raises because humans (and infant humans as well) have physical and mental properties, and it is deep philosophical problem understanding what are these two set of properties and how they interact with each other. Traditionally, attempts to solve this problem have given rise to different views on consciousness – mainly, materialism, dualism and idealism. In a nutshell, materialism claims that mental states are just physical states; idealism claims that physical states are mental; and dualism claims that the mental and physical are two separated entities. The thesis approach on infant consciousness aims to not engage in the mind-problem debate. The claim that infants are conscious seems to be compatible with different metaphysical views of consciousness.

The focus of the thesis is on the descriptive aspects of infant consciousness and its phenomenality, and on how they are correlated with brain processes and behavior. These claims about description and correlation will be compatible with different metaphysical theories, including materialism and dualism. But both philosophical and scientific theories will be relevant to these questions when they posit specific correlations between physical processes and consciousness.

One crucial difference among theories of consciousness is whether or not the theory takes phenomenal consciousness as a real phenomenon. Broadly speaking, we find, among theories of consciousness, two opponent positions: illusionism and phenomenal realism about consciousness. Illusionism is the view that holds that phenomenal consciousness is an illusion (that is, it is not instantiated in our world); and it aims to explain why experiences *seem* to have phenomenal properties (Frankish 2016).[26] Illusionists explain conscious states in functional terms and deny that experiences have phenomenal properties; experiences seem to be a real phenomenon, but they are illusory. This view captures some similar intuitions defended by eliminativism[27] and some reductive explanations of phenomenality. Phenomenal realism is the view that holds that there are phenomenal properties and those phenomenal properties are not conceptually reducible to physical and functional properties (Chalmers 2010). The phenomenal properties are properties that characterize the mental states by what it is like to have them or how they feel.

In this work, I will be adopting the standpoint of phenomenal realism, and I will assume that illusionism is false. So, theories of consciousness that accept, or at least, do not rule out phenomenal realism (as illusionism does) will be considered as potential candidate to explain the emergence of consciousness in infants. In what follows I will investigate the major philosophical and scientific theories of consciousness and analyze what each theory will predict about whether infants are conscious.

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[26] For a better characterization of the view see Frankish (2016). Defenders of illusionist positions include among others Dennett (1991), Humphrey (2011), Pereboom (2011), Rey (1995).

[27] Eliminativism (eliminative materialism) is the view that holds that consciousness does not exist and there are no facts about conscious experience. Eliminative materialism rejects folk psychology and talk of phenomenal experiences. It claims that folk psychology is wrong about the actual nature of the mind and brain. Folk psychology posits the existence of phenomenal properties that pick out nothing that is real in the actual world.

There are many philosophical and scientific theories of consciousness. I do not intend to analyze a comprehensive list of them.[28] I will focus on the most successful philosophical theories that have consequences for the problem of the distribution of consciousness: representationalism, higher-order theories, and panpsychism. Then, I will briefly discuss two major scientific theories: global workspace and information integrated theory. I will not explore the merits or demerits of each of these theories in explaining consciousness; I will present what can be concluded about infant consciousness regarding each theory.

Panpsychism

Panpsychism[29] is the view that some fundamental physical entities have mental states. The relevant sorts of mental states we will be concerned here are conscious experiences. According to panpsychism, some fundamental physical entities are conscious: that is, that there is something it is like to be, for example, a member of some fundamental physical type. Chalmers (2015) calls it panexperientialism. In this view, consciousness is fundamental and ubiquitous. Consciousness is ubiquitous because all the constituents of reality have some phenomenal properties. Consciousness is fundamental in the sense that it cannot be reduced to or explained in terms of anything else. The most popular form is constitutive panpsychism (Seager 1995; Goff 2017),[30] the view that holds that facts about consciousness are grounded in facts about the consciousness of their fundamental material parts. Accordingly, consciousness exists in extremely basic forms, and it is from this simple forms that the complex consciousness of humans and animals are derived. The consciousness of a human is more complex than the consciousness of a bird; the consciousness of a bird is more complex than the consciousness of a fish; which is more complex than the consciousness of an insect; and the light of consciousness can continue indefinitely into inorganic matter with fundamental physical entities. So, consciousness is a uniform property of

[28] For a cogent analysis of theories of consciousness see Block (2009). Block discusses three major theories of consciousness (biological theories; global workspace theories; and higher-order theories) in order to compare which theory presents a better explanation of phenomenal consciousness. He concludes that the biology of the brain is what matters to consciousness; thus, biological theories are the better candidates to explain consciousness.

[29] Panpsychism can be contrasted with the opposing view of emergentism. Emergentism holds that the mental arises from, or is reducible to, completely non-mental features. All popular forms of physicalism, such as the neural identity theory and functionalism, are emergentist theories fundamentally opposed to panpsychism (Goff 2017).

[30] For other forms of panpsychism – such as emergentist panpsychism; panprotopsychism (the view that fundamental entities are proto-conscious); panqualityism; cosmopsychism (the view that the world as a whole is conscious) – see Seager (1995); and Goff (2017).

the universe varying from simple system with simple phenomenology to complex system with complex phenomenology.

On this view, everything is conscious, so infants are conscious. That is, it feels like something to be an infant, and even to be a fetus, although a natural consequence of the view is that their conscious experiences are less complex than adults' conscious experiences. However, panpsychism does not specify the conditions under which infants' conscious experience occurs, or how complex their experiences are, or which states are conscious and which are not, or how their brain system evolves to form adult consciousness.

Representationalism

Representationalist approaches hold that consciousness is exhausted by its intentional or representational properties; conscious mental states are intentional states that inform us about the state of the world. Two conscious or experiential states that share all their representational properties will not differ in any mental respect. The phenomenal character of the experience is a representational property of the experience. There are multiple representational approaches, and what is central to all them is the idea that conscious state is entirely explicable as a kind of intentional state, and that intentionality can be explained in physical terms. The most popular version is the externalist approach (taken by Michael Tye 1995, 2000; Fred Dretske 1995; William Lycan 1996) that holds that phenomenal properties are identical to certain represented external properties[31]. But how to distinguish a representational content that is conscious and phenomenally characterized from an unconscious representation? In Tye's view, for a representation content to be identified with phenomenal character, it must meet some further conditions. The representational content must qualify as (1) poised, (2) abstract, (3) non-conceptual, (4) intentional content; the phenomenal character of a representational state is the same as a state of "PANIC". The first condition is that the representation content must be non-conceptual; that is, the subject does not need to possess any concept necessary for the correctness conditions of the application of the content.[32] The second condition is that the relevant content

[31] I examine the representationalist theories of consciousness in Chapter 2.

[32] Against the conceptualist view of experience which connects the content of experiences to the content of beliefs, Tye (1995, 2000) claims that our conscious experiences are not constrained by our conceptual capacities. He characterizes the content of conscious perceptual states as a nonconceptual representational content. He argues that

must be abstract, that is, no concrete object or surface need to enter in the content of the state. The third condition is that the content must be *poised*; that is, the content must play a certain functional role in the control of action. The idea is that the information those phenomenal states carry must be directly available to make a direct impact on beliefs and desires. For example, a feeling of pain should cause an immediate cognitive effect of the desire to protect the body, to move away to what is causing the pain.

Do infants meet Tye's conditions for consciousness? In the next chapter, I will argue that infants can represent the world. I will also argue that this representation is nonconceptual and abstract. Aside from this, the key question is whether infants' representations are *poised* for the control of action in Tye's sense. Infants are still developing their cognitive systems, so perhaps not all sensory representations that are available to us may yet be available to them. But they seem to have a variety of representational states that are poised, in the sense that they are directly accessible to the relevant cognitive centers and to action control.

In the case of pain, for example, infants display a range of behaviors when they feel pain (they cry, they scream their lungs out, they show facial expressions, they change their body postures and movements in a particular way; they also show avoidance movements when they detect the source of pain) that suggest they are conscious of pain sensory inputs. Infants are sensitive to warmth and cold and to changes in temperature at birth. Thermal stimulation in their mouth elicits mimetic reactions, mouth movements, head movements, and squirming; but they also change their sucking behaviors. Their sucking responses become irregular, and it leads to disorganization and cessation of the response – they refuse to suck if the milk in their bottle is too hot (Pratt 1954). This evidence suggests that infants' sensory system produces tactile sensory representations that are poised to have an impact on controlling infants' sucking actions.

This suggests that, at least according to Tye's version of representationalism, infants will have many conscious sensory states.

Higher-Order Theories

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the content of perception is more fine-grained than the content of thought; that is, conscious experience provides detailed, rich and determinate information. Tye's main example is color experience. He claims that a determinate color property (for example, a particular shade of red, say, red_{29}) can be represented in experience even by subjects that lacks the concept of red, or the concept of a shade of red (say, a shade of red_{29}), or even the concept of color.

Higher-order approaches analyze consciousness in terms of some relation between conscious states and higher-order representations (either perceptual representation or thought representation) of that state. So, a phenomenally conscious mental state is a mental state that is the object of a higher-order representation of a certain sort (perception-like or belief-like). In this approach, what makes a mental state (e.g., perceptual states, mental images, bodily sensations, emotional feelings) phenomenally conscious is the fact that it is accompanied by a simultaneous and non-inferential higher-order state whose content is that one is now in that state. One disagreement among higher-order approaches concerns how each theory cashes out the notion of higher-order states. Higher-order theories come in three variants: higher-order perception theories, higher-order thought theories, and self-representational theories.

On higher-order perception theories (HOP), the higher order states are perception-like; humans (and perhaps other animals) have first-order non-conceptual perceptions of states of their environments and bodies, but they also have higher-order non-conceptual perceptions of their first-order perceptual states of. A popular version of higher-order perception theory is the 'inner-sense theory' defended by Armstrong (1968, 1984) and Lycan (1996). The inner sense view holds that humans have first-order senses that detect properties of the environment and the body to produce non-conceptual representations that can then serve to ground thoughts and action-planning, but they also have *inner* senses, which detect the outputs of the first-order senses (i.e. perceptual experiences) to produce non-conceptual higher-order representations of those outputs (i.e. higher-order experiences). In this view, a phenomenally conscious mental state is a state with non-conceptual intentional content, which is the target of a higher-order non-conceptual intentional state, via the operations of a faculty of 'inner sense.'

Many objections have been raised against the idea of an inner sense (or an intra-mental monitoring system) that generates higher-order experiences of our first-order experiences (Dretske 1995, Sturgeon 2000, Carruthers 2000), and it remains as a challenge for the view to explain the existence of such a complex organization. In the case of infants, there is no evidence of a faculty of 'inner sense' that generates higher-order experiences. There is evidence that infants have perceptual experiences with non-conceptual content representing the fine-grained content of that experience (as I will discuss in Chapter 2), but there is no clear evidence that they have such a complex mechanism that generates higher-order representations. So, it is inconclusive whether infants have higher-order perceptions of first-order perceptions.

The most popular version of higher-order thought theory (HOT) has been proposed by Rosenthal (1997, 2000, 2005). According to Rosenthal's view, a phenomenally conscious mental state is a state which is the object of a higher-order thought, and which causes that thought non-inferentially. This theory aims to explain the difference between conscious and unconscious mental states. What makes a mental state unconscious is the lack of the relevant higher-order states about it. What makes a mental state conscious is that one is aware of having it; and being aware of something is a matter of having a representation of it. A conscious mental state is a state we are reflexively and directly aware of being in it. Mental states are conscious because they are themselves the representational contents of higher-order representations. The *what-it's-likeness* of a mental state enters only when we become aware of that first-order state and its qualitative properties by having an appropriate meta-state (a reflexive thought) directed at it.

There is no evidence that infants have higher order thoughts, or that they can be reflexively aware of their conscious states. It seems implausible to attribute any higher-order concept to infants at least at birth. They do not seem to be able to entertain thoughts about their mental states. They do not seem either capable of having concepts of their mental states. If higher order thoughts are necessary for making a state phenomenally conscious, and if infants do not have concepts of their mental states, it follows that infants (and non-human animals) may do not have phenomenal consciousness.

Traditionally, an important objection to HOT theory has been that it denies phenomenal consciousness to non-human animals and infants. According to Carruthers (2000), all forms of higher-order theory (e.g., HOT, HOP, or self-representional theories) entail the rejection of common-sense intuition that infants and non-human animals are conscious; and this is a source of resistance to the theory. Carruthers' position on this issue is to challenge the common-sense intuition; he claims that this intuition can be explained away as a mere by-product of our imaginative identification with infants: we imagine that their experiences are phenomenally conscious, and we assume that the experiences *imagined* are similarly conscious (Carruthers 1999, 2000).

However, there is no consensus among HOT proponents about infant consciousness. Some higher-order theorists (Gennaro 2004; Van Gulick 2004) have been trying to resist this theoretical entailment. They argue that HOT is compatible with infant consciousness (and perhaps even late

fetal consciousness). The common strategy is to claim that the higher-order representation is simpler than the reflexive and introspective or mind-reading cognitive structure required by some intellectualized versions of the theory. Recently, Gennaro (2012) has suggested that a HOT approach is jointly consistent with conceptualism and animal and infant consciousness. He accepts that consciousness requires the capacity to have mental concepts, and he argues that some rudimentary mental concepts can be possessed by infants. His view is that infants have primitive conceptual representation, which enable them to have primitive forms of the requisite higher-order thoughts, which enable them to be conscious of their experiences. Gennaro presents empirical evidence from developmental psychology suggesting that infants possess core concepts that are innate: concepts of self, time, cause, agent, body-awareness (Rochat 2001, Carey 2009). He also presents evidence that young infants possess mental concepts: belief, desire, intention, perception. Other concepts, such as pain and hunger, might have been acquired very early via the application of the innate concepts.

On Gennaro's view, infants acquire mental concepts within the first year of life. If this is right, then the HOT view can allow infants to be conscious within the first year of life. However, if newborn babies lack mental concepts, then the HOT view cannot allow consciousness in newborns. It is still a potential objection to the HOT view that when an infant screams with apparent pain, there is no conscious experience of pain.

The third variant of higher-order approaches is the self-representational theory proposed by Kriegel (2006) and others. On this view, a phenomenally conscious mental state is a state which also, at the same time, possesses a higher-order intentional content, which represents itself to the person who is the subject of that state. In this view, the relationship between the first-order state and the higher-order state is constitutive, or internal; the conscious state is internally connected with its representation. Kriegel claims that the first-order state and the higher-order representation need to be integrated with one another in order for the resulting complex state to be phenomenally conscious. The integration of first-order perceptions with higher-order representations gives rise to the properties that are distinctive of phenomenal consciousness. On this view, a first order state of a subject is conscious if and only if the subject has a higher order mental state that is an appropriate representation of the first order state; and the first-order state is logically connected with the higher order state. So, the conscious mental state is literally directed back at itself. So, the first-order state becomes 'self-presenting'. All and only conscious states are

self-representing; whatever a conscious experience represents, it always also represents itself; and it is in virtue of representing itself that a mental state is conscious. Recently, Kriegel (2009) reformulated his self-representational theory. In the new version, he distinguishes two components of a phenomenally conscious state: a qualitative character (representation of properties of the environment); and a subjective character, the for-me-ness component (representation of the state itself in the appropriate way). What makes a state phenomenally conscious, what constitutes its subjective character, it is a certain kind of self-representation. A mental state is phenomenally conscious if its subject is aware of it, if its subject has inner awareness of the state.

Like higher-order theories, self-representational theories explain phenomenal consciousness as involving a certain sort of metacognitive abilities. In this sense, self-representational theory may be as demanding as higher-order theories: if infants lack metacognitive abilities, the theories will deny phenomenal consciousness to infants. There is no evidence that infants have awareness of their own mental states, emotions and motivations. However, Kriegel (2009) argues self-representational theory can accommodate the case of infant consciousness. Infants may be aware of their beliefs and experiences in a way that does not employ any concept. They may possess a nonconceptual self-representation, which requires only minimal metacognitive abilities. This nonconceptual self-representation grounds the inner awareness that is the key to phenomenal consciousness. As long as infants have nonconceptual self-representation, there is no obstacle to them being conscious.

In chapter 3, I will argue that infants have nonconceptual self-representation. If so, then Kriegel's self-representation allows that infants can be conscious.

Scientific Theories

There are also scientific theories that aim to explain consciousness. The two most prominent theories are information integrated theory and global workspace theory. Given the purposes of the thesis, I will discuss these theories only briefly, focusing on their predictions about infant consciousness.

Information integrated theory (IIT) has been developed by Giulio Tononi (2008);[33] its central idea is that consciousness is identical to integrated information, and information integration is necessary and sufficient for consciousness regardless of the substrate in which is realized. According to IIT, consciousness is an information property of systems, and it can be measured by a mathematical measure φ that aims to measure not merely the information in the parts of a system but also the information contained in the organization of the system over and that in its parts which thus corresponds to the system's degree of informational integration. Such a system can contain many overlapping complexes and the complex with the highest φ value will be conscious. IIT applies a mathematical measure to represent conscious experience, and then derives predictions about which circuits in the brain are necessary to produce conscious experiences. Additionally, it claims that consciousness varies in quantity and comes in many degrees which correspond to φ values. Even a simple system (e.g., a thermostat) can be conscious to some degree. IIT also aims to explain the quality of consciousness; phenomenal consciousness is determined by the totality of informational relations within the relevant integrated complex.

What does IIT predict about infant consciousness? It is highly probable that even newborn infant brains have some degree of integrated information, and that the infant brain will have φ higher than any subsystem of the brain. If so, IIT predicts that newborns are conscious, because their systems present some degree of integrated information. IIT probably predicts that infants are less conscious than adults due to the low level of informational relations within infants' systems comparing to the high level of complex relations in adults' systems.

The global workspace theory is a cognitive theory initially developed by Bernard Baars (1988).[34] The main idea is that the brain has a global workspace, defined as a momentary memory storage, which is a central limited capacity resource that broadcasts information for widespread access and use by other systems. Broadcasting information from the global workspace give rises to consciousness. The contents of the global workspace are the contents of consciousness. Thus, whenever we become conscious of a sensory input (e.g., the sound of a familiar voice) we can retain that information in a short-memory; and consciousness is the brain-

[33] For a more detailed presentation of the information integrated theory see Tononi (2008).
[34] For a comprehensive presentation of the global workspace theory see Baars (1988), and Dehaene and Naccache (2000).

wide sharing of this information that is stored (i.e., broadcasting the information in the workspace); once the information is loaded in the workspace, many cognitive processes can make use of it. Baars' model has been further developed by Stanislas Dehaene and others (2000), and connected to specific brain areas and neural systems that correspond to the global workspace. In Dehaene's model, consciousness occurs when the relevant content enters the larger global network involving both primary sensory areas as well as many other areas including frontal and parietal areas associated with attention. Conscious perception begins with the activity ("ignition") of that larger global network; activity in the primary sensory areas will not suffice no matter how intense or recurrent. The main challenge to the theory has been finding a measure of brain activity that can detect when a sensory information becomes consciously perceived, and when it is unconsciously perceived. Dehaene and colleagues (2011) have been using electroencephalogram (EEG) to measure the brain's electrical activity. They reported finding a neural signature of consciousness, that is a particular type of electric wave, called P300, that occurs whenever an adult is attending to a consciously perceived stimulus (e.g., a photo or a sound). The electric activity starts around 300 milliseconds after the onset of the image; the electric activity is not present when the image is not consciously perceived, because the image has been masked. For measuring the P300 wave, they use the method of visual masking, which consists of rendering an image invisible by flashing it very briefly onto a screen and by adding a distracting image just after the first image to mask the first image from the subject's mind (the first display vanishes from consciousness). The electrophysiological component correlates with the subjective reports of visibility given by adults; it correlates with conscious recognition of the image so to speak. Dehaene and colleagues claim that this measure allows to identify the exact moment when a stimulus becomes consciously seen by subjects, and this is one of the signatures of perceptual consciousness.

What does global workspace theory predict about infant consciousness? In this model, it is not clear whether infants are conscious. A recent study showed evidence for the appearance of broadcasting with brain maturation (and presumably higher level of consciousness) in young infants. Dehaene and colleagues (with Sid Kouider as first author) used the electrophysiological marker of conscious perception (the P300 brain wave) found in adults, to map when consciousness first arises in infants (Kouider et al. 2013). They recorded the brain activity (EEG recordings) of five- to fifteenth-month-old infants while they looked at face photographs at

various durations, using the masking patterns that prevent visual consciousness. They show that infants have a stage of conscious processing functionally similar to the neural marker found in adults.[35] They found a wave resembling the P300 (found in adults) in five- to fifteenth-month-old infants, even though the electric wave found in infants is weaker and more variable, and it is triggered much later than in adults. By one-year-old, an infant clearly display similar brain activity pattern as adults display when they are seeing something. From this evidence, Kouider and colleagues (2013) conclude that consciousness is present in infants from five-month-old, but absent in newborns and pre-term infants.

However, it is controversial whether this electrophysiological component constitutes a reliable neural index of conscious perceptual information in preverbal infants. In a recent review on neural correlates of consciousness, Koch and colleagues (2016) argues that this neural signature of consciousness (the P300 wave that Kouider and colleagues (2013) have been used to infer consciousness in infants) might be illusory. Koch and colleagues (2016) present evidence that shows that a similar wave (P3b-like) can be both present in absence of consciousness, as in cases of comatose patients, and absent in the case of some conscious adults; thus, no inference about infant consciousness can be drawn relying on this evidence.

Koch and colleagues' (2016a) discussion of a paradigm shift in the research of neural correlates of consciousness also raises difficulties for theories of consciousness that impose cognitive requirements for consciousness. Past studies have directly related consciousness with activity in the fronto-parietal network. The frontal cortex is immature in infants' brain, and it is associated with higher-order functions (with thought like experiences) and involved in task monitoring and reporting. Koch and colleagues argue that the prime candidates for neural correlates of consciousness is a hot zone primarily located in a posterior cortical region, and associated with sensory areas.[36] It is still an open debate the accurate anatomical location of this hot zone and the mechanism underlying it; but there is much support for the idea that the future direction for identifying neural correlates of consciousness is to search for activity in sensory

[35] For a detailed and accessible description of Sid Kouider's study on infants' brain activity see "The Conscious Infant" (2013) by Christof Koch (2013).

[36] Koch and colleagues (2016b) claim that there is robust evidence that most lesions in the anterior cortical area fail to affect consciousness directly; they argue that this evidence suggests that the anterior cortex seems to not be necessary for consciousness.

areas. If this is right, it suggests that cognitive theories of consciousness, including many higher-order theories of consciousness, may be too demanding.

So, what can be concluded from these philosophical and scientific theories of consciousness? Most of the philosophical theories are friendly to infant consciousness. Some versions of higher-order theories are inconclusive, though a clear exception is Carruthers' version of higher-order theory, which explicitly claims that infants do not meet the necessary and sufficient conditions for consciousness. Among the scientific theories, integration information theory predicts that infants are conscious; and for global workspace theory, it depends on how the global workspace is defined.

My conclusion is that most of those theories give explanations of consciousness which are compatible with the claim that infants are conscious, and a number of them (e.g. panpsychism, representationalism, integrated information theory) positively suggest that infants are conscious. The main obstacle for theories of consciousness that deny infant consciousness seems to be the association of consciousness with a higher-order cognitive capacity and the ability of verbal reports present in adults that infants lack. I think these theories are imposing an implausibly strong condition for consciousness, however.

Ned Block (2009) raises similar concerns about what he calls 'ambitious' higher-order theories. Block argues that higher-order theories, such as Rosenthal's (2005) and Carruthers's (2000) views, have trouble in explaining phenomenal consciousness and to account for the "explanatory gap" (Nagel 1974; Levine 1983). The case of infant consciousness is one of the problems for those views. Block (2009) presents evidence from a research from synaptogenesis[37] in human brain that suggests that areas of the brain that specialize in sensory and motor function develop earlier than the prefrontal cortex areas associated with thinking. In a newborn's brain, the synaptogenesis starts at the same time in different cortical regions; but the final peak density

[37] Synaptogenesis is the process of creating new synapses in the brain. Roughly speaking, synapse is a structure that allows a neuron to pass an electrical or chemical signal to another neuron. There is an increase in synaptic density during human postnatal development. Block (2009) discusses evidence from a pioneer study by Huttenlocher and Dabholkar (1997); they show that synaptogenesis in human cortex begins around the third semester of gestation and the first two post-natal years; and there are regional differences: the process occurs earlier in sensory and motor areas, and later in prefrontal cortex. As Block describes, the synaptogenetic study "derives from autopsy results on human brains from age 28 weeks after conception to 59 years of age. The result (…) is that auditory synaptic density peaks at about 3 months (and probably likewise for synaptic density in other sensory areas), whereas the association areas of the frontal cortex peak at about 15 months" (Block 2009, p.1117). The same evidence is discussed by Baars and Gage (2010).

occurs in different ages and different areas. The synaptic density increases much more in sensory and motor areas, and those areas reach a peak at about three months, whereas the prefrontal cortex area does not reach its peak until well after the first year. Sensory and motor processes mature first, followed by areas involved in top-down control of behavior. This suggests that infants become phenomenally conscious earlier before they are capable to have higher-order thoughts, which, as Block points out, raises doubt that phenomenally conscious states are always accompanied by higher order thoughts.

After concluding that infants are conscious, the next step is to investigate the features of infant consciousness. In the next section, I will investigate the phenomenal features of consciousness in human adults and explore what are the eligible types of phenomenology that may compose infants' experiences.

1.5 The Varieties of Phenomenology in Infants

Consciousness has many features. Philosophers do not always agree on what these features are. Conscious states are usually characterized as having features such as qualitative character (involving sensory qualities), phenomenal structure (involving space, time, body), representational structure (involving intentional content), first person introspective access, subjectivity, self-perspectival organization, and a unified stream of consciousness.

Is infant consciousness structured in the same way as adults' consciousness? Certainly, many psychologists would agree that infants' conscious experiences have phenomenal character, representational character and subjectivity. At the same time, many psychologists would agree that infants lack other features of adult consciousness, such as self-perspectival organization and first-person introspective access to their phenomenal experience. Any features of adult consciousness that are missing in infants must emerge at a later point in development.

We can also ask about the specific phenomenology of early conscious states. What is it like to be a newborn? Here I will make an initial attempt to describe the phenomenal structure of newborns' experiences, trying to analyze whether those experiences might be organized in the main features of adults' phenomenal consciousness. Later I will explore some of these features in more detail, focusing especially on intentionality (in chapter 2), and self-consciousness and the phenomenology of agency (in chapter 3).

In what follows, I will draw on Uriah Kriegel's taxonomy of types of phenomenology presented in his book *The Varieties of Consciousness* (2015), to examine the phenomenal features of infant consciousness, and to explore what are the eligible types of phenomenal primitives that may compose infants' experiences.

Conscious experiences can come in many varieties. The list of phenomenal states proposed by Kriegel includes perceptual experiences, bodily sensations, felt reactions or emotions, and felt moods, as well as the experience of thinking, entertaining, imagining, the phenomenology of volition, agency, moral phenomenology, and possibly the phenomenology of freedom and aesthetic experience. There is no consensus about how many of those types of phenomenology are required to characterize the stream of consciousness, and what might be the most basic and primitive types of phenomenology present in the structure of consciousness. The only types of phenomenology that have been uncontroversially accepted are forms of sensory phenomenology: perceptual experience and experiences of pain and pleasure. Some philosophers of mind would accept only a list of phenomenal conscious states that is restricted to sensory phenomenology. Tye (1995) gives a related list: sensory perception, bodily sensations, felt reactions or emotional feelings, and felt moods. On a minimalist view, the only primitive types of phenomenology are sensory experiences that have phenomenal character, and all types of phenomenology (e.g., experiences of thought and agency) must be derived from these.

Kriegel argues for a rich and comprehensive phenomenological inventory that comprises, apart from sensory phenomenology, a variety of forms of nonsensory phenomenology, including cognitive and conative forms. His own pluralist inventory of primitive types includes: perceptual experience, algedonic experience (pleasure and pain), imaginative experience, cognitive experience, conative experience, and the experience of entertaining. These six types are regarded as irreducible phenomenal primitives. The primitivism adopted is committed to the thesis that each primitive phenomenology has its own proprietary phenomenology that cannot be reduced to more basic types of phenomenology. For example, the phenomenology of entertaining that includes phenomenal states such as 'contemplating a proposition' (e.g., contemplating the proposition that I can fly to Rio) is a primitive type. It exhibits a phenomenal property (e.g., entertaining a proposition) that cannot be reduced to any other phenomenal property. The phenomenology of 'entertaining that p' is distinct from 'judging that p,' 'perceiving that p,' 'desiring that p,' and 'imagining that p.' Surprisingly, emotional phenomenology is not included

in the package of primitive phenomenology. Kriegel defends a reductionist view of emotions. He understands emotional experience as a combination of perceptual, cognitive and conative aspects. (This reductionist view of emotions might be problematic in the case of newborns' basic emotions, as I will discuss later).

I have sympathies for Kriegel's pluralist phenomenal primitivism as an attempt to capture the complexity of the structure of human consciousness. However, Kriegel is not primarily concerned with the structure of consciousness of creatures that are unlike us (such as animal consciousness or alien consciousness), and he is also not concerned with early states of consciousness in humans. Using adult human consciousness as a guide to understand other forms of consciousness can be misleading. Even if nonsensory phenomenology is a basic irreducible type of phenomenology in the case of adults, it may not be present in all conscious creatures. In those creatures, the basic sensory phenomenology endorsed by minimalist theories of consciousness may be more suitable for describing their consciousness.

One question is whether a pluralist account such as Kriegel's is committed to the idea that the primitive types identified are necessarily present in any stream of consciousness. Kriegel (2016) argues for the view that six distinctive types of phenomenal primitives must be posited in order to adequately characterize the stream of consciousness; they are indispensable posits to fully describe the stream of consciousness. How should we understand Kriegel's necessity claim? The claim may be understood in a strong sense meaning that the six types of phenomenology characterizes all kinds of possible experience. If that were the case, it would rule out a wholly sensory stream of consciousness. From the beginning, this taxonomy would threaten to exclude animals, and most likely, infants from the realm of consciousness. However, Kriegel's phenomenal pluralism is compatible with the idea that a stream of consciousness can lack some of the primitive types. It is conceivable, for example, that a conscious system lacks all kinds of sensory phenomenology, a *sensory zombie*, but it is still capable of nonsensory phenomenology, e.g., the phenomenology of thinking. The idea of a sensory zombie was developed by Kriegel (2016) in a thought experiment about Zoe, a mathematical genius who has conscious thinking but no sensory experience.[38] It is also possible in principle that a system

[38] Kriegel presents the Zoe thought-experiment to support his claim that cognitive phenomenology is basic, primitive, and irreducible to other types of phenomenology. Zoe is a mathematical genius who was born healthy but suffered an accident on her twentieth birthday, and acquired a strange neurological condition. Although Zoe's

could have sensory but not nonsensory phenomenology. So, one way to understand Kriegel's necessity claim is that these primitive types are indispensable for fully characterizing ordinary adult human consciousness.

A minimalist taxonomy *a la* Tye may be plausible in the case of animals, because it is arguable that nonsensory phenomenology is not present in animals. However, despite similarities with animal consciousness, any investigation of infant consciousness should take into account the context of its development. Unlike animals, infants develop reflexive consciousness and introspective capacities. It is worth investigating whether any type of nonsensory phenomenology is already present in early stages of consciousness, and, if not, when and how nonsensory phenomenology emerges.

Introspection plays a crucial role in Kriegel's methodology in understanding the basic structure of consciousness. This raises the question of whether this introspective methodology can be applied to the case of infants who lack introspective capacity. However, as I argued earlier, we can combine introspective insights about adult human consciousness and our knowledge of the connections between adult consciousness and adult behavior with empirical observations of infant behavior to draw conclusions about infant consciousness. That method can be applied in principle to help determine whether Kriegel's varieties of phenomenology are present in infants.

Notwithstanding its constraints, Kriegel's taxonomy of consciousness offers a *prima facie* useful map to guide the investigation on infant consciousness. I will examine the evidence in

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injured brain is still capable of unconsciously processing some sensory information that keeps her mind functioning, she has suffered brain damage that makes her incapable of undergoing any type of sensory phenomenology (visual, auditory, gustatory, olfactory, tactile, proprioceptive). She also lacks the capacity for undergoing algedonic, mood or emotional experiences, and the capacity to remember anything of her life prior to the accident. Zoe is a sort of sensory zombie. Her inner life is a darkened world devoid of sensory, emotional and algedonic experience. However, Zoe's mathematical abilities are still preserved. She spends her time formulating and solving mathematical problems; she has a lively intellectual life, full of cognitive activities: thinking, considering, judging, realizing, intuiting, remembering. According to Kriegel, the relevant phenomenology of Zoe's life is cognitive. From this logically possible scenario, Kriegel develops the *Zoe argument* for cognitive-phenomenal primitivism, that proceeds as follows. Imagine that one day Zoe has an episode of suddenly realizing a mathematical proof. The proof is suddenly and vividly presented to her mind. First, this relevant episode involves a nonsensory cognitive property. Second, this cognitive property is phenomenal, because the episode raises an explanatory gap between the property of undergoing it and the physical properties involved in the realization of the process. Third, as Zoe has no sensory phenomenology, the phenomenal property is not accompanied by any perceptual, algedonic, or emotional phenomenology. Then, the conclusion is that there is a cognitive phenomenology property that is not reducible to perceptual, algedonic or emotional phenomenology (Kriegel 2016, 57-61).

infants for each of the six types of primitive phenomenology. Then, I will discuss the case of emotional phenomenology as a derived type, in the context of infant consciousness.

At this point, it seems useful to clarify Kriegel's terminology. Kriegel's taxonomy is organized in two axes. The first axis concerns the manner which each type of experience presents whatever it presents. Experiences are not identified by the content they present, but rather by the *way* they present whatever they present; that is, experiences are structured by the phenomenal properties of their *attitudes*, by *how* they are experienced. The second axis distinguishes between sensory and nonsensory presentation. Those types can be captured by pairs of sensory/nonsensory attitudes: sensory-presenting-as-true (perceptive); sensory-presenting-as-good (algedonic); sensory-mere-presenting (imaginative); nonsensory-presenting-as-true (cognitive), nonsensory-presenting-as-good (conative), and nonsensory-mere-presenting (contemplative). Kriegel's taxonomy is distinctive and not free from controversy. For the purpose of the thesis, I will not discuss potential problems or objections; my focus here is on the applicability of this taxonomy to characterize infants' stream of consciousness.

I start with sensory phenomenology. Kriegel posits three sensory primitive types – perceptual, algedonic, imaginative – and a fourth derived type – emotional phenomenology. Sensory phenomenology includes, roughly speaking, a variety of types of experiences ranging from sensory perception, bodily sensations and visceral emotional feelings, experiences of pain and pleasure, to the imaginative presentation of those sensory experiences. One important issue is how to individuate each type of sensory experience (e.g., a visual experience of a face) and what holds them together as a sensory type (e.g., sensory perception experience). Kriegel suggests that all experiences are presentational[39], that is, there is something they are intentionally directed at; and each type of experience is distinguished by how they present what they present. For example, perceptual phenomenology involves "presenting-as-existent" (e.g., experience of 'seeing my mother's face' presents my mother under the guise of the real); algedonic sensations (feelings of pain or pleasure) involves "presenting-as-good" (e.g., experience of 'mother's breast milk' presents breast milk under the guise of the good), or "presenting-as-bad" (e.g., experience

[39] Kriegel's idea is that experiences (conscious mental states) have attitudinal feature rather than a content feature. Each type of phenomenology exhibits a distinctive *attitudinal phenomenal property* of the form presenting-as-F its content. Thus, in this sense, what characterizes each type of phenomenology is not its content but the attitude the subject takes toward the content.

of 'pain in my arm' presents my arm as feeling bad); imaginative phenomenology involves "mere-presenting" (e.g., experience of imagining sucking my mother's breast).

The paradigmatic case of sensory phenomenology is perceptual experience. Most philosophers hold that perception experiences are conscious states, and, as such, exhibit phenomenality – which is to say that there is something that it is like for one to be in such a state. A sensory phenomenal state, roughly speaking, involves qualitative or experiential properties often referred to as "qualia" or "raw sensory feels."

Can we attribute sensory phenomenology to infants? The types of sensory phenomenology we can attribute to infants is directly associated with the corresponding sensory capacities they are able to exercise. Even if infants lack some conscious experiences that adults can have, they may have other experiences that adults might lack. We should understand the distinctive phenomenology of infant consciousness.

At birth, most of adults' sensory capacities are functional. The general issue here is whether we can attribute or not phenomenal character to infants' sensory experiences. In the previous sections I argued that infants are conscious, and that they feel pain. In addition, I discussed some evidence from brain developmental research that show that sensory and motor areas develop earlier and faster than cognitive areas (Huttenlocher & Dabholkar 1997; Casey *et al.* 2005; Block 2009; Baars & Gage 2010). Given that infants are conscious and their brain sensory areas are earlier activated (it has it peaks of density synapses around 3 months of age), it is extremely plausible that they have sensory consciousness. The hypothesis of sensory consciousness at birth has been supported by several theorists (e.g., Merker 2007; Langercrantz & Changeux 2009; Zelazo & Gao 2009; Rochat 2011). Infants have sensory systems and sensory experiences that exhibit phenomenology. Then the question is, what types of sensory phenomenology do infants have?

Human sensory capacities go far beyond the classic five sense modalities – seeing, hearing, smelling, touching, tasting (Macpherson 2011).[40] An expanded categorization of sensory modalities includes also bodily sensations, proprioception (which includes awareness of position of parts of the body and movement of the body), the sense of balance, the sense of pressure, the sense of temperature (hot and cold). Other bodily sensations include: hunger, thirst, the sense of

[40] For an expanded view of sensorial modalities see Fiona Macpherson (2011).

wet and dry. We find evidence of all those sensory experiences in infants. In 'What is it like to be a newborn?' (2011), Philippe Rochat describes a rich phenomenal background (to use Barry Dainton's terminology) of a newborn baby. He presents several findings that suggest a variety of capacities for undergoing experiences that compose newborn's typical stream of consciousness.

Infants can see colors of objects and shades of light and dark, they perceive shapes and sizes of objects in three-dimension space at a short distance of one's body in front of one's eyes; they also perceive movement. They are innately attracted to face configurations. Newborns can hear sounds, volume, objects being vibrated at locations at distance from their body. They also show preferences in their auditory experiences, they prefer to suck in certain ways on a pacifier, to hear the voice of their mother over the voice of a female stranger (cf. Rochat 2011). They have gustative experience too; they savor sweet tastes (e.g., sugar), and show strong rejection of bitter tastes. They also have olfactory experience and tactile experiences (they feel tickles, they feel the different texture of a pacifier). They feel a distinct sensitivity to their own bodily movements via proprioception and internal (vestibular) receptors in the inner ears. Both proprioceptive and vestibular sensitivities are well developed and operational at birth.

Despite the variety of sensory capacities an infant can display at birth, some of those capacities differ from corresponding capacities in adults, and may have a distinctive phenomenology. For instance, the case of tactile sensation (discussed in section 1.1) shows that infants might perceive tactile sensations as less oriented by the visual cues of infants' own body position; the case of perception of colors in newborns (to be discussed next chapter) suggests that their color experiences change in the first six months of life. Of course, infants do not show all the range of variation of adults' perceptual experiences and bodily experiences. Some perceptual experiences (e.g., hearing a word) and bodily sensations (e.g., orgasm or need to urinate) depend on abilities that they have still not developed.

The second case of sensory phenomenology is algedonic experience. Algedonic experiences are experiences of pain and pleasure. The phenomenal signature of algedonic experiences is *to represent-as-valuable* their objects. Infants are capable of feeling pain and pleasure: they cry when they are hungry, they smile after a good feed. Experience of pain is associated with a negative affective quality: an injury in my arm hurts, it feels bad. I discussed in section 1.3 the evidence for pain in infants and pain-related behaviors that suggest the presence of a negative

valuational property; infants feel the 'painfulness of the pain.' They also feel other negative affects: hunger, cold, high sounds, and other negative body sensations. The experience of pleasure is associated with positive affective quality, and infants display several behaviors that suggests the capacity of experience a positive valuational property. They are strongly oriented toward food and comfort and an optimum level of stimulation (e.g. not too loud, not too bright, but with a lot of contrast and movement). They are attracted to affective states linked to satiety, specific odors and tastes, dim lights, contrasted visual contours or regions of high contrast on a visual display, high-pitch sounds and human voices with particular contours (e.g., the voice of the mother). They also display pleasure in search for bodily feelings such as excitability and its control and suppression.

The third sensory type is imaginative phenomenology. The phenomenology of imagination raises a challenge: how to characterize its phenomenal character in a way to capture the distinction between imagining *x* and perceiving *x*. When I see yellow birds outside my study window, I have a visual experience that is phenomenologically discernible from my experience of imagining yellow birds, even though both experiences share similar sensory features of the same object. Traditional views on imagination claim that either there is no difference between perceiving and imagining given that both experiences share the same content, or there is a difference in degree, because the experience of perceiving is more intense or vivid than the experience of imagining. Kriegel argues against both views. He suggests that the phenomenology of these experiences is not exhausted by the content or the degree of intensity of the content presented; they have different kinds of phenomenology. Perceiving and imagining present their content in a different *manner* with respect to its existence: my visual experience of yellow birds *presents-as-real (or existent)* yellow birds; my imaginative experience of yellow birds *presents-as-unreal (or nonexistent)* yellow birds.[41] In Kriegel's account, imaginative experience involves an irreducible kind of phenomenal property, presenting-as-unreal.

[41] For criticisms on Kriegel's view of imaginative phenomenology as presenting its content as non-existent see Kind (2016). Kind's main objection is against Kriegel's proposal of differentiating perceptual and imaginative phenomenology by means of their presentation of existential status. There is a variety of ways that a content can be presented in imagination, and Kriegel's account might failure to capture all of them. For a counter-example to the imaginative phenomenology of "presenting-as-nonexistent", I can imagine an object that exists and it is present in my visual field: e.g., imagining possible ways to rearrange my study table which is in front of me right now. In this case, I am imagining an object which content is presented-as-existent and is presented-before-the-eyes.

There is little evidence of imaginative abilities in young infants. The ability to imagine different possibilities and alternatives to reality seems to require sophisticated cognitive abilities that young infants do not possess. Imagination appears later in development in the context of pretense behavior in children; it can be found in 2-3-year old children (Harris 2009; Gopnik 2009). By the age of 15-18 months, children are capable of engaging in primitive games of make-believe and games of pretense initiated by others; by the age of 24 months most of the children are able to participate fully in those games (Harris 2000). The experience of imagining is especially obvious in children's games of pretend play and role play, and it plays a crucial role in the development of other cognitive capacities, such as theory of mind. Their capacities for imagining possibilities or constructing counterfactual situations, for simulating events and roles, and taking and elaborating on the perspective of others occupy a considerable amount of time in young children lives (Gopnik 2009). Young children even seem able to identify the imaginative phenomenal property; they are able to make a clear distinction between thinking and imagining, or perceiving and imagining, desiring and imagining (Harris 2009).

However, the experience of mental imagery might be a precursor of imaginative phenomenology. Imagining an object that is momentarily out of sight or is absent, such as in the case of mental imagery, has a rich imagistic phenomenology, though not as detailed as images derived from visual perception. This ability emerges earlier in development; young infants use mental imagery of recently-viewed objects to reach for them in the dark. In Clifton and colleagues (1991), infants viewed at a distance two kinds of objects: a small object that required one-handed grasp, and a large object that required two-handed grasp; each object were previously associated with a distinctive sound, and subsequently were given the opportunity to reach for them in the dark. Infants by the age of 6 months used the appropriate grasp, which suggests that they have used visual mental representations to grasp the object. One question is whether those visual mental representations are associated with any distinctive imaginative phenomenology, or whether they are experienced by the infant as a quasi-perceptual experience in some degree.

The fourth case of sensory phenomenology is emotional phenomenology. Adults can undergo a huge variety of emotions. Those emotions can vary from feeling happy and sad, to feeling ashamed, frustrated, disappointed, angry, afraid, jealous, humiliated, proud, excited, overjoyed; feeling love, admiration, respect, grief, guilt, indignation, envy, dislike, empathy, antipathy, envy, sympathy, remorse, regret, concern, and so on. Emotional experiences include

as well: feeling bored, surprised, nervous, feeling curious, etc. Infants cannot undergo this rich palette of emotions; the emergence of those complex emotions is directly linked to child cognitive development. However, we have evidence that infants can feel emotions. They do have a rich affective life since birth. The principal source of evidence is their facial expressions: crying face, smiles, sad and pouting face (lower lips protrusion), angry face. Although their expressions are often fleeting, subtle, and less well organized than adults' expressions, most of human facial expressions are innate and can be observed after birth (Sullivan & Lewis 2003). They also display bodily movements (vocalizations, screams and postures) and behavioral dispositions congruent with emotions.

Infants also undergo a variety of emotions, although not as wide as adults. Infants can feel interest, surprise, enjoyment, disgust, anger, and distress. Emotions such as sadness, fear and embarrassment appear later in development. For example, infants are not able to display fear until after 7–12 months because experience and cognitive abilities are needed for appraisal of strange and dangerous environmental events (Izard & Malatesta 1987). Those emotions are context-appropriate; they are elicited by specific contexts. Early in development, infants start using the evaluational feature of emotions to evaluate the contexts of their interactions. They show, for example, increased allocation of attention to faces expressing negative emotions, such as anger or fear. A 7 month-year-old baby is able to detect signals of fear in others; they are able to read fear from the eyes of others (Jessen & Grossmann 2014) and they start respond to those eyes cues and being sensitive to fear.

How does the emotional phenomenology of infants and adults fit into Kriegel's taxonomy? Kriegel argues that emotions are not primitive feelings; they involve complex feelings constituted by more basic components. He claims emotional phenomenology is a sort of blend of bodily feelings with cognitive evaluation and motivation for action. Kriegel's reductive account argues that emotional states involve a variety of phenomenal features that can be reduced to primitive types of phenomenology, such as perceptual (phenomenology of bodily feelings, proprioception and sensations), algedonic (unpleasant feelings in the case of negative emotion; pleasant feelings in the case of positive emotion), cognitive (feelings of appreciating events in the world), and conative (a felt motivation to "do something about it") phenomenology.

The emotional phenomenology of infants seems to not correspond to the paradigmatic profile of adults' emotional phenomenology as suggested by Kriegel. It seems very implausible that we can find the cognitive component, and it is not always clear which conative component is involved. As I will discuss next, it is unlikely that early conscious states exhibit the type of cognitive phenomenology required for certain emotional states, such as appreciating a potential danger in the case of fear, or appreciating a failure in the case of frustration. So, the idea that basic emotions have certain minimal cognitive phenomenology seems to be ruled out, at least in the case of infants.

A natural suggestion is that infant emotions differ from adult emotions because they involve only three of the four elements: algedonic, conative, and proprioceptive elements. Kriegel entertains this possibility in the case of some emotions, such as the case of startle, that might not involve any cognitive element. Thus, infant emotions might be a case of emotions without cognitive phenomenology. In this case, an emotion such as frustration would have just three experiential components: body feelings often associated with frustration; the feeling that something is bad (algedonic phenomenology); and a motivational experience of avoiding something unpleasant (conative phenomenology). However, this raises the question of what differentiates a basic emotion such as frustration from a more complex one, such as indignation, given that, according to Kriegel, the absent cognitive component is crucial to characterize the intentional feature of emotions such as frustration and indignation?

A potential response is that indignation but not frustration requires cognitive phenomenology. Once infants develop the cognitive abilities necessary for understanding an event as an injustice and an event as a failure, they will be able to experience complex emotions, such as indignation. This formulation might explain how babies expand their palate of emotions and acquire more complex ones. It seems very plausible that some of adult emotions require a variety of complex cognitive capacities that are not available to infants. For example, consider the case of feeling regret about having been disloyal to an old friend; it seems to involve appreciating an event as betrayal and plus appreciating oneself as being disloyal. This sort of emotion (regret about being disloyal) involves being able to understand what is friendship, loyalty, promise, expectations, and in addition being able to have self-conscious representations and self-image representations, that is, being able to self-represent and to represent what others

expect of one. This is a highly complex cognitive process and infants need a few years of emotional development to be able to achieve it.

However, in this picture, we still need to distinguish between primitive emotions. What distinguishes frustration from anger? Or frustration from disgust? Both anger and disgust seem to have similar algedonic and conative phenomenology. In this case the only element to distinguish them would be the body feelings (proprioceptive phenomenology). But Kriegel argues against the old theory of feelings, where emotions are reduced to body feelings.[42] His new theory of feelings describes emotions according to the intentional aspect involved. One possible response to this is to consider infants' emotions as a sort of basic feelings (proto-emotions) that require cognitive development to acquire the presentational feature of adults' emotional phenomenology.

This is a somewhat simplistic picture of infants' emotions, and moreover it does not explain the fact that infants' emotions are context-sensitive. Infants react congruently with disgust, or anger or sadness to different circumstances; they seem able to discriminate sad events from frustrating events, and from disgusting events. Thus, they seem able to emotionally evaluate events in the world even before they are able to cognitively distinguish those events. One potential explanation is that emotions allow infants to evaluate events in the world even before they are capable of appreciating cognitively those events. In this case, emotions might have an evaluative phenomenology which is not reducible to algedonic phenomenology; that is, it goes beyond evaluating events positively or negatively. This idea seems compatible with Michelle Montague's theory of emotions. According to Montague (2014), emotions are complex intentional phenomena that represent objects and states of affairs as having *evaluative properties*; emotions possess their own distinctive *sui generis* kind of phenomenology, which Montague calls

[42] Kriegel proposes what he calls a *new feeling theory* of emotion – an elaboration on the classic James-Lang theory of emotion). The James-Lang theory of emotion proposes that emotions are constituted by feelings of bodily events. Bodily events are visceral, muscular and skin-related feelings; and feeling a bodily event is proprioceptively perceiving that event. Using Kriegel's terminology, on the James-Lang theory, emotions are identical to proprioceptive phenomenology; so, the feel of an emotion is the feel of a proprioceptive perception. Kriegel's new feeling theory preserves part of the classic feeling theory of emotion, that is, the idea that the nature of emotions is captured by the way they feel (the emotional phenomenology); but it rejects the Jamesian view that emotional phenomenology is exhausted by body feelings (e.g., visceral and proprioceptive feelings). Emotions are experientially encoded. It has an intentional component (directed to events in the world) and a phenomenal component, that is feelings towards events in the world or states of affairs; thus, it has what Kriegel calls cognitive-phenomenal intentionality. It involves presentation of feelings but not just feelings directed at bodily events (as the Jamesian view suggests), but also feelings toward worldly events. (cf. Kriegel 2015).

'evaluative phenomenology.' In this view, infants are not only evaluating objects and states of affairs as good or bad, or as pleasant and unpleasant (as it is the case of algedonic phenomenology). They are emotionally evaluating events as sad, or joyful, or frustrating, or disgusting, or annoying, or surprising, or boring, or interesting, or distressful. There is not enough space to develop this idea here, but it seems a promising way of understanding infant consciousness.

On this picture, infant emotions involve proprioceptive, conative, and algedonic phenomenology as before, but it also involves a richer sort of evaluative phenomenology. This evaluative phenomenology need not be cognitive phenomenology. It might be seen as a sort of generalization of algedonic phenomenology beyond positive and negative evaluation. A view like this might better account for the distinctive character of emotion phenomenology in infants.

Now, I will examine cases of nonsensory phenomenology. Kriegel proposes three types of nonsensory phenomenology: cognitive, conative, and entertaining.

Entertaining phenomenology is the phenomenology of entertaining a proposition. The paradigmatic state is the state of entertaining a proposition *p*; and it involves essentially the attitudinal phenomenal property of *merely-presenting-p*. The phenomenology of *merely-presenting* a proposition (as opposed to the phenomenology of presenting-as-true (in the perceptual cases); or presenting-as-good (as in the conative cases)) have no correctness conditions or normative difference; it merely represents their objects. There is no evidence that infants can have propositional thoughts. The capacity of entertaining, contemplating or considering propositions emerges later in development.

Cognitive phenomenology is the phenomenology of conscious thought, associated with an experience of thinking or judging that something is the case. It involves the attitudinal property of *nonsensory* presenting-as-true *p* ('nonsensory' is added to rule out the case of perception). At first glance, we have no evidence that infants have conscious experiences of their own cognitive states. There is compelling evidence of early cognitive processes that might explain infant's early awareness of properties in the physical world. Evidence suggests that infants have sophisticated awareness of physical rules, like object permanence (Baillargeon 1986), object movement (Spelke et al. 1994), object identity (Carey 2009). There is no clear evidence that any

conscious thoughts are involved in those processes. If those processes do involve conscious thoughts, perhaps there might be some phenomenology associated with them.

In her recent book *The Given*, Michelle Montague (2016) argues that there is a kind of cognitive phenomenology associated with the process of positing objects. She claims that most of our perceptual and cognitive experience involves a demonstrative thought that refers to a particular physical object, e.g., "that object". Positing objects involves the experience of "this object". It involves being presented experientially with a persistent and unified entity. Young infants can identify physical objects as persistent and unified without possessing the concepts of objects. There is evidence for object representations by 2 months of age (Carey 2009). Montague claims that the phenomenology of positing objects is present in the case of young infants and this shows that concepts may not be necessarily involved in those experiences. Even if it is the case that demonstrative thoughts are involved in perception and associated with a particular phenomenology (the phenomenology of particularity as Montague calls it), it is still not clear if young infants undergo those experiences. However, positing objects might be a potential root of cognitive phenomenology in infants.

The third case of nonsensory primitive is conative phenomenology. For Kriegel, conative phenomenology involves the phenomenology of motivation and action, and includes a variety of states such as desiring to φ, wanting to φ, intending to φ, choosing to φ, deciding to φ, being willing to φ, planning to φ, to mention a few. Kriegel argues that some of our conative mental states instantiate primitive phenomenal properties that cannot be reduced to another type of property (e.g. perceptual, algedonic, cognitive). For Kriegel, conative states are essentially evaluative; they are characterized by their commitment to the value of their objects; that is, conative states such as desiring, wanting, liking, wishing, approving are characterized by their attitudes to be committed to the goodness of its objects. Conative phenomenology exhibits what Kriegel calls *nonsensuous presenting-as-good* (or *as-valuable*). Drawing on Paul Ricoeur's work, Kriegel identifies two processes as the core of conative phenomenology: the experience of deciding and the experience of trying. First, the experience of deciding involves an attitude of commitment to a future plan, which is the decision's content, and it involves a pull to action. Decisions are essentially connected to actions, and are directed to the right (deciding the right thing to do); so, decisions *present-as-right* the actions they are about. Second, the experience of trying involves three elements: 1) trying aims at the right; 2) it essentially involves an experience

of effort; 3) it is an essential complement to the experience of deciding (it is impossible that one should decide to φ without trying to φ). In Kriegel's account, deciding and trying are two components of a single conative experience.

Infants are active at birth. They perform a range of actions directed at goals that suggest that they may be able to have goal-directed agency. Goal-directed agency is the capacity for action directed toward a goal, caused by a mental state that represents the goal, which, in the case of infants, might be an image-like representation. Evidence from infants' behaviors suggests that they may undergo experiences of acting associated to their actions. However, if any phenomenology of acting is available for infants, it probably may not involve decisions, or, at least, conscious decisions to do the right thing. At first glance, Kriegel's characterization of conative phenomenology imposes a condition that infants may not meet.

In his discussion of Kriegel's account, Joshua Shepherd (2016) suggests another picture of conative phenomenology that might be more friendly to infants' sense of agency. Shepherd rejects two aspects of Kriegel's account. First, Shepherd rejects the characterization of conative phenomenology as evaluative. The experiences of trying have no evaluative attitude; these experiences are not committed to the goodness or badness of the goal of the action. The experiences of trying are just concerned with the execution of the command, with the intention or the goal of the action. Shepherd argues that experiences of trying can be better characterized by an imperatival attitude concerned only to command actions, that is, they *present its objects as-to-be-done*. Second, Shepherd rejects the claim that the paradigmatic conative experience is the joint pair deciding-trying. He claims that deciding does not necessary imply the initiation of the implementation of an action. If we consider the case of distal decisions (where I intend to φ in the future), the decision is disconnected from the implementation of the action. Deciding and trying are distinct types of experience. Shepherd suggest that the phenomenology involved with intending, trying, and acting might be better characterized as a kind of agentive phenomenology.

In chapter 3, I will discuss at length the evidence for agentive phenomenology in infants and will discuss how an account like Shepherd's might help to explain infants' sense of agency. My view is that infants may not have conative phenomenology as Kriegel understands it, that is, as an experience that necessarily involves a deciding-trying process, where motivational aspects (desiring, wishing and hoping) and the action aspects (intending, trying and acting) are

associated. But infants might have what Shepherd calls agentive phenomenology: a different type of primitive phenomenology that involves an irreducible feature of agency and action, but not necessarily the motivational aspect of Kriegel's account.

To conclude, infants seem to have perceptual, algedonic, emotional, and agentive phenomenology. The case of cognitive phenomenology is hard to assess. Infants do not seem to have full-blown cognitive phenomenology, but it is not impossible that they have some primitive version associated with demonstrative thoughts. Infants do not seem to have any imaginative phenomenology or entertaining phenomenology, which are experiences associated with abilities they are still developing.

Chapter 2

Consciousness of The World

The previous chapter argued for the thesis that infants are conscious and that they have a variety of experiences. This chapter addresses the question whether infants' conscious experiences represent the world and what do their experiences' representational content might be. I will argue here that their conscious states often represent their surroundings.

Following Christopher Peacocke's account of conscious subjects (2014), I claim that human beings are subjects capable of perceiving and representing our surroundings; we are also capable of representing our body sensations and emotional feelings, and capable of self-representing ourselves. These are distinctive features of subjective experience that among others compose the phenomenal background of typical adult human subjects. Regardless the variety of experiences, for the purposes of this chapter, I will be mostly concerned with the relation between consciousness and the world. Whenever an adult human subject sees, for example, a yellow bird flying out in the window, the yellow bird seems to be a part of the external world that figures in her visual experience; she does not feel as if the bird is part of her consciousness, the bird seems to be out there in the world.

I am not assuming that all conscious beings perceive or represent their surroundings. There is a variety of forms of conscious experiences among creatures. Different creatures might have different capacities for experiences and different phenomenal backgrounds,[43] thus, different conscious systems. As some philosophers argue (see Dainton 2008, 2012), there might be primitive subjects – as in primitive life forms such as glowworms or fireflies – which enjoy a rudimentary form of consciousness. Those primitive creatures might be capable of rudimentary forms of experience – gleam of light or frequencies of vibration – and their experiences might

[43] The phenomenal background of a subject, in the sense proposed by Dainton (2002, 2008), is jointly constituted by the conjunction of a variety of capacities of experiences that compose typical streams of consciousness. Whenever we attend to a conscious experience (e.g., a visual experience of a yellow bird flying out in the window), we attend to this experience against the backdrop of other experiences which we are not directly aware or paying attention to at that moment, such as bodily sensations and tactile experiences, auditory experiences, emotions, motivations, bodily movements, mental images, conscious thinking. This background of phenomenal experiences forms the overall character of our stream of consciousness.

represent few or even just one property (e.g., brightness, or instance of vibration). Arguably there might even be simple conscious systems that do not represent anything at all, a pure consciousness without content. In this condition, the subject is alert and awake, but no experience figures in her stream of consciousness. It might be a form of "pure awareness" entirely devoid of phenomenal content, like certain forms of consciousness which meditation can induce, as suggested by Barry Dainton (2002).

Nevertheless, adult human consciousness does seem to represent the world. Adult consciousness often has intentional content that informs subjects about the state of the world. A conscious experience of a yellow bird in my visual field often carries information that there is a yellow bird in front of me. Although different theories of consciousness may disagree in what kinds of property are represented in consciousness, or, more specifically, in conscious perception (e.g., physical properties, sense-data, relational properties, dispositional properties, sensational properties, phenomenal properties), almost all theories of consciousness agree that conscious mental states have an intentional or representational aspect that represent properties "out there" in the world. Similarly, different theories of consciousness may disagree about the relationship between consciousness and intentionality, but most theories of consciousness agree that conscious mental states have intentionality, they are about things and refer to things.

Regarding the intentionality of conscious states, skeptics about infant consciousness may insist that newborns' conscious experience lacks some features that adult conscious experiences often exhibit, such as representing their surroundings or representing properties that are "out there" in the world. They may also insist that in infants, these representations are not conscious. Infants might be able to represent external properties of their surroundings without consciously representing it. These representations can be unconscious, produced by perceptual mechanisms in a sub-personal level. Someone may also argue about the qualitative content of those experiences, whether those experiences have representational content that represents the world as being in certain way, or whether they have just sensational properties. As Peacocke argues (2008), some experiences do not have representational content concerning the subject's environment; they do not represent the world as being in a certain way. But these experiences still have sensational properties that are not possessed in virtue of the representational content of

the experiences. This is the case of afterimages.[44] Afterimage is an image continuing to appear in one's vision after the exposure to the original image has ceased; subjects continue visually perceiving a negative afterimage that appears in one's vision after the exposure to the original image has ceased. In this case, the sensational properties of the visual experience do not represent any property in the world, there is no representational content concerning the subject's environment connected to the sensational property of the visual experience. There are other similar cases as certain bodily sensations such as itches, tickles, orgasms, moods and pain (although there is less philosophical consensus about experience of pain being nonrepresentational) that involve sensational properties with no representational content.

Nevertheless, I think there is good reason to believe that infants' conscious experiences represent the world. In what follows, I analyze empirical evidence from infant studies that suggests that infants' conscious experiences do represent their environment since early stages. I will not address the question whether newborns represent themselves in any way when they represent the world. This issue will be addressed on the next chapter when I discuss which kind of self-information is present in early conscious states.

These issues are relevant to metaphysical theories of consciousness, such as representationalism. Much of the scientific research on consciousness assumes some sort of representationalist account. Representationalism is a theory about phenomenal consciousness. Representational theories of consciousness aim to explain phenomenal consciousness in terms of representation. Representationalism holds that all conscious experiences have a constitutive representational structure. I will argue that newborns' experiences in vision and other modalities do represent the world. I will suggest that, while this supports a representationalist viewpoint, it causes problems for one popular version of representationalism.

2.1 An Infant's Perceived World

An infant is awake and alert in her crib. She is surrounded by physical objects that usually compose a natural baby developmental niche. She directs her gaze to a little lamb mobile hanged over the crib; the mobile swings while it plays a lullaby. What does the infant see? Does she

[44] For a view that all feelings and experiences – including the cases of afterimage and bodily sensations – have intentional content see Tye (1995).

perceive the little lambs? Does she discriminate one object (say the lamb) from another (say the crib)? Does she perceive the mobile movement? What does she hear? Does she feel her body? Does she smell her mother's breast milk in her clothes? Does she feel the texture of the pacifier on her tongue? How does this scenario look like for her? If she perceives her surroundings (physical objects, colors, shapes, sounds, smells, textures, body position), does she perceive it in a coherent and structured way? Does she perceive it from her own self-perspective?

When operating in normal conditions, we adults accurately perceive, through our perceptual systems, an organized and coherent world of objects, events and people moving around us. We represent a variety of physical properties that coherently form an organized representation of the world. We distinguish colors, shapes, sizes, sounds, textures, odors, flavors; we distinguish one object from another; we discriminate inanimate objects from people; we discriminate our own body movement from objects moving around us. Given their perceptual capacities at birth, do infants perceive the world in the same way we adults perceive?

If we wish to reply to this question, we need to understand how our sensory systems generate representations of the environment surrounding us and how to characterize the initial states of our sensory representations. The main question here is how to find out what are the early sensory representations. Another important question is how the mind operates to generates the early sensory representations and what are the learning mechanisms that operate on them. Two approaches are relevant here: the empiricist-oriented approach and the nativist-oriented approach.

For many years, psychologists have speculated about the development of the perceptual systems, and how infants' perceptual systems develop through maturational and learning mechanism into a sophisticated system of representations of the world. The traditional approach was dominated by the empiricist view that infants' perceptual and sensory representations of the world were disorganized and very limited at the beginning of life. William James famously believed that infant's world was a "blooming, buzzing confusion" (James 1890/1981, p. 496). Jean Piaget (1954) was highly influenced by this empiricist picture of infants' mental lives. Piaget proposed that infants were born with a limited repertoire of sensory-motor representations. Those primitive representations were limited to sensory-motor reflexes and currently sensory experiences. The main idea was that infants' perceptual systems were impoverished and immature at birth and it would gradually develop into a more complex and structured system as a

consequence of years of activity and intensive learning processes. In Piaget's constructivist account, an infant's sensory and perceptual representations of the world come from her learning experience with the environment. Sensory representations – such as form, shape, size, color, depth, position distance – are acquired through the combination of reflex activity with higher activities on objects. Any abstract representation, such as a representation of objects as a unitary entity, must be acquired later as a result of a gradual process of acting on objects in different ways.

This empiricist idea has been greatly revised. Infant studies have been highly influenced by James Gibson's ecological approach on perception, which has offered an important counterpart to Piaget's constructivist theory. According to Gibson (1979), our perceptual systems evolved over evolutionary time to detect perceptual invariants directly in the external world without the need of learning or experiencing. We detect perceptual invariants through the phenomenon called constancy. Constancy is our tendency to perceive an object as the same despite changes in our sense-impressions. Perceptual invariants specify constancy of shape, size, and colors of objects, the permanence and properties of objects, the three-dimensional world of space. Perception is direct in the sense that perceiving a property is based on detection of information specifying that property; it involves detection of invariant relations and it does not need to be enhanced by past experiences or learning processes.[45] Although Gibson himself is not committed to any form of nativism in perception or to the idea of innate mental operations, his ecological approach allows for the idea of an innate perceptual organization present at birth.

In *The Origins of Concepts* (2009), Susan Carey suggests a nativist picture of early sensory development. She claims that our initial sensory representations are much more complex and rich than the empiricist view has supposed. Carey's idea is that evolution has equipped us with an innate repertoire of conceptual representations, and those representations cannot be reduced to the perceptual primitives suggested by the empiricists or the sensory-motor primitives suggested by Piaget's theory. Carey's main thesis is that we are born with what she calls "core concepts".

[45] Gibson himself is an anti-representationalist; he denies that perception (vision) is a cognitive activity (a sort of implicit inferential process) which generates sensory representations of the environment. He understands visual processes as a system that is naturally constrained to perform certain operations; visual systems evolved in close contact to the world, and vision relies on environmental regularities rather than representing them. Visual processing is not inferential; it relies on environmental features to perform its function. Gibson's account is not itself committed to any form of nativism on perception or innate representations, but his ideas have influenced some nativists. (For a contemporary discussion of Gibson's anti-representationalist view see Nico Orlandi (2014))

Core concepts are innate perceptual analyzers for detecting certain types of entities in the world, and for thinking about them in a certain way. Those representations are domain-specific (e.g., the mechanism that computes depth does not compute color); and they are innate in the sense that they are not an output of learning or associative process. Core cognition concerns at least three domains: number, physical objects/causal interactions and agency/goal directed action. One of the domains involves the perceptual input analyzers dedicated to forming object representations. Contrary to Piaget's hypothesis that infants lack object permanence, Carey's core cognition hypothesis claims that infants are innately endowed with the representation of physical objects as permanent and spatiotemporally continuous.

This new nativist approach has been greatly supported by the advance of new methodologies. Since the 1960s many new procedures and methodologies in infant studies have helped to shape our understanding of infants' perceived world. To know what perceptual information infants can process and what kind of representation of the world their perceptual systems can generate, we need tools for accessing their mental states. As I discussed in the previous chapter, it is very hard to access infants' mental states only via behavioral observation. In addition, it is not easy to train newborns and infants to give subjective reports about the stimuli they perceive using the traditional psychology methodology used in adult subjects. There are many experimental paradigms that monkeys, for example, can be trained to perform and to give subjective reports, but infants cannot. To address this challenge, scientists have been developing other indirect ways to have access to infant consciousness, relying on other abilities they display. The discovery of techniques, such as looking-time and eye-tracking, have allowed to objectively measure infants' behavior and to generate reliable inferences of infants' mental states.

One of the new methodological tools in infants' studies is the habituation and novelty preference paradigm. Habituation of looking time has become the standard method in infant studies and a tool for assessing mental processes in infancy.[46] Infants are attracted to new and complex stimuli, and feel bored with same and familiar stimuli. They are much more attracted by an alternating series of stimuli (e.g., different objects, a different sequence of colors) than they are by a series of the same stimuli (e.g., same object, same color). Infants' looking time decreases

[46] Habituation is a form of learning in which a subject decreases response or habituates to stimuli with repeated stimulation. It is not caused by sensory adaptation or motor fatigue; and it does not involve associative learning, where the presented stimulus is associated with another stimulus or event such as a reward or punishment.

or habituates, with repeated exposure to the stimulus, and it increases with novelty. The hypothesis in the habituation situation is that infants compare the currently available stimulus with a remembered stimulus: when similarity is detected infants' looking decreases when differences are detected their looking time increases (Oakes 2010). This method is relatively easy to use with newborns and infants, and it has been used to assess a broad range of infants' abilities.

There are different types of mental representations: sensory, perceptual, conceptual. It is a challenge to find a way to theoretically distinguish among them; and it is another challenge to determine which representations are available to infants. It is possible that innate conceptual representations are available to young infants as Carey (2009) claims. The debate about the existence of innate concepts and core cognition and the debate about the relationship between perception and cognition are both huge debates in developmental psychology and philosophy of perception.[47] For the purposes of the thesis, the relevant point here is that developmental studies have shown that infants at birth represent the world around them, and surely in a more complex and structured way than earlier psychologists have argued before. Nowadays, the orthodoxy is that infants are born with an intrinsically organized perceptual world, adapted to perceive people, physical objects and events that are encountered in their surroundings. From massive information, an infant's innate perceptual system registers and selects structured representations of its surroundings.

At birth, infants see, hear, touch, smell and taste a variety of objects that they encountered in the environment. They are able to discriminate among a variety of properties: colors, shapes, sizes, contours, locations, textures, pressures, temperatures, odors, flavors, acoustic signals, voices, speech sounds. They perceive low-level attributes but also high-level attributes, such as face recognition and speech perception.

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[47] One relevant question here is the distinction between sensory/perceptual representations and conceptual representations. Philosophers often understand concepts as predicative elements of thoughts and cognitive processes, and understand perception as non-conceptual. Non-conceptual content is a sort of content that cannot be a content of a cognitive state such as a belief or thought. A mental state is non-conceptual if the subject of the state need not possess the concepts required to characterize the state's content from the subject's point of view (Siegel 2016). There is a huge contemporary literature discussing the nature of perception and cognition. I cannot explore this issue in detail here. For the purposes of the thesis, I will assume the idea of non-conceptual perceptual content. In the case of the core concepts, some representations are perceptual analyzers and might be better described as having non-conceptual content.

Early perceptual biases organize infants' perception of the world, and those early biases become rapidly fundamental principles that underwrite their development. Human infants, like many species, are endowed with innate preferences to attend to the visual (e.g., face recognition) and auditory (e.g., human speech) cues of their conspecifics. Human neonates prefer listening to speech and vocalizations (from human and non-human primate) compared to many other acoustic signals (e.g., synthetic sounds), suggesting that humans are born with a bias for speech (Vouloumanos & Werker 2007). By 3 months, infants' listening preferences are sharpened, yielding a species-specific preference for human speech (Vouloumanos et al. 2010). These preferences for human vocalizations suggest that infants represent acoustic properties of voices and speech they perceive in their environment and this capacity is crucial for language acquisition and for further tuning (by 6-10 months) to native language sound structure.

Neonates are born with representational bias to perceive faces. They are innately attracted to face-like configurations. They are able to imitate the facial gestures produced by a face in their first encounter with that face (Meltzoff & Moore 1977, 1983) and they show preferences for attractive faces. The "attractiveness effect" is found with newborn infants, who were averaged less than three days from birth at the time of testing (Slater et al. 2000).

For the purposes of this chapter, I will mainly explore the case of infant visual perception. First, visual perception is the foremost modality explored and exemplified in the literature on consciousness and perception. Infant research on visual perception – particularly on color perception – has advanced a lot in the last decades. In addition, for some philosophers of perception (e.g., Burge 2010, 2014), unlike other sensorial systems that just carry information about the world, visual perception plays a dominant role in accurately representing the world to the individual.[48] Second, unlike the other sense modalities, there is no opportunity for visual experience prior to birth. Vision is a relatively undeveloped sense at birth; newborn visual

[48] Burge (2010, 2014) holds that there is a sharp distinction between sensory systems and perceptual systems. Burge's argument can be summarized as follows. Perception involves representational states. Representational states are those that have accuracy conditions. A perceptual state represents the world as being accurate or inaccurate. If the accurate condition is met, the representational content and the associate perception are accurate. For Burge, formation of a perceptual state involves a type of objectification which is marked by perceptual constancies. Perceptual constancy is perceptual capacity systematically to represent an attribute as that very attribute under significant variations in registration of proximal stimulation. The paradigmatic case of perception is visual perception that exhibits perceptual constancies, such as color, luminance, shape, size, spatial and object constancies. For Burge, a sensory system is perceptual only if the system involves perceptual constancies. Many sensory capacities do not exhibit perceptual constancy, so they do not invoke representational content that set accuracy conditions. For example, the sensation of pain does not require representational content or perceptual constancy.

system is as immature as newborn visual cortex. Both eye and brain increase in volume about three or four times compared with the rest of the body (Slater 2004). Nevertheless, neonates' visual systems are active and functioning at birth and they generate a visual picture of the world that is similar in a number of respects to the adultlike picture.

A neonates' visual world is impoverished when compared with that of an adult one. Neonates have poor sensitivity to contrast differences, grating acuity, and accommodation, and limited color discrimination (Slater 2004). Acuity, accommodation, color vision and depth perception improve rapidly, and infants' vision is nearly adultlike by 6 months of age (Slater 2004). However, many organizational principles are functional and contribute to the perceived stability and coherence of the visual world at birth. Figure 1.1 shows how the mother's face might look to a newborn (Bremner & Fogel 2004). Despite degraded and unfocused, the image is not inverted or distorted and it has enough information that allows the infant to recognize the mother's face.

Figure 1.1 A face as it might appear to a newborn (left) and to a human adult (right). (From Bremner & Fogel 2004).

Immediately after birth, neonates are able to foveate (to direct their gaze) to small objects of interest in their visual array. They track with their eyes and even show attempts at reaching toward objects that move close by in their field of view. They preferentially track objects that consist of a schematic face-like display (Slater 2004). They still do not have stereopsis[49] that

[49] Stereopsis is the perception of depth and 3-dimensional structure obtained on the basis of visual information deriving from two eyes by individuals with normally developed binocular vision. Because human eyes are located at

allows for binocular vision. Although stereopsis does not appear before the end of the fourth month from birth (Teller 1983), neonates have other depth cues at birth that allows them to perceive a three-dimensional object shape (Slater et al. 1984). Shape and size constancy and slant perception are also organizing features of perception that are present at birth (Slater, Mattock, Brown 1990; Slater & Morison, 1985). Newborns experience shape at birth, and they represent shape as an invariant perceptual feature of objects in the environment. Using preferential looking paradigm and familiarization, Slater and Morison (1985) have found that newborns detect and respond systematically to changes in objects slants, and that they have the ability to perceive constant, objective, real shape of an object across changes in slant. They also perceive the objects as such, in its real true size, regardless of its changes in distance relative to the infant's viewing perspective (Slater et al. 1990). Shape and size constancies are organizing features of perception which are present at birth. Newborn babies have the ability to extract the constant, real shape of an object that is rotated in the third dimension. They perceive the object as such, in its true shape and size.

Newborn infants also perceive stimulus compounds (e.g., a green circle, or a red triangle); they see the features of objects as bound together (e.g., the greenness and the circularity of a green circle) and they clearly remember the composition they have seen, showing novelty preferences when exposed to new composition (Slater et al. 1991). They also seem to perceive relations among properties. They perceive events: movements, agency, causality; they are able to track moving objects in the environment and to fixate objects of interest. They also perceive people and their own bodies.

2.2 Are Infants' Representations Conscious?

In the previous section, I presented enough empirical evidence that infants perceive and represent their surroundings. But are those representations conscious representations?

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different lateral positions on the head, binocular vision results in two slightly different images projected to the retinas of the eyes. The differences are mainly in the relative horizontal position of objects in the two images. These positional differences are referred to as binocular disparities. Disparities are interpreted by the visual system as actual depth differences, and so they gain three-dimensionality.

I have argued in chapter 1 that infants are conscious, and that some of their mental states (e.g., bodily sensations such as pain) are conscious experiences. I also briefly discussed the case of perception, claiming that the same sort of considerations suggest that infants' perception is conscious. However, as we discussed previously, complex perceptual process can occur in conscious adults without access to conscious processing (Block 2011, 2016). How to distinguish conscious from unconscious perceptual processes in the case of infants?

To discuss the case in more detail, I will adopt the assumption that a representational view of perception and consciousness is correct. That is, perceptual states involve representations of the world, and conscious perceptual states are a matter of representing the world as being in a certain way. On the representationalist view, consciousness is intentional or representational. We can say that a conscious state has intentionality if it represents something, if it is directed toward something (the directedness or aboutness of mental states). The representational content of an experience is what it represents. For example, if I think about my dog, this mental state is directed toward my dog. The representational content of my thought has something to do with my dog.

Representationalism (also called intentionalism) implies that facts about the representational content of an experience fix or determine the facts about its phenomenal content. The phenomenal content is a sort of representational content. Phenomenal differences among perceptual states can be captured in terms of differences in representational content.

Representationalism[50] is a view that analyzes conscious states as a kind of intentional state. All conscious experiences have a constitutive representational structure. Every phenomenal property is identical to a certain intentional property. According to representationalism, a representational property is the property of representing the intentional content in a certain manner M, where M is the same manner of representation for all phenomenal states (Chalmers 2004, 2010; Bourget & Mendelovici 2014). Here M is the demarcating *manner of representation*, and M demarcates representations with phenomenal properties from

[50] Chalmers (2004) distinguishes pure and impure versions of representationalism. Pure representationalism claims that phenomenal properties are identical to pure intentional properties. A pure intentional property is a property of representing a certain content. Impure representationalism claims that phenomenal properties are identical to impure intentional properties. An impure intentional property is a property of representing a certain content in a certain manner. For example, the property of representing redness in imagination is an impure intentional property (see Chalmers 2004, 2010; Bourget & Mendelovici 2014). I mainly focus on Tye's view, which is an impure representationalist view.

representations with non-phenomenal properties. For example, on one approach, M demarcates states with the property of visually representing the content of seeing green, and precludes conceptual states, e.g., states with the property of thinking about unique green. When we have a color experience, such as the experience of seeing green, the phenomenal greenness of the experience is identical to the property of representing external greenness (in an appropriate way). The property of representing an external object in an appropriate way is the property of representing a certain intentional content in a certain manner.

Representationalists typically defend a physicalist account of the manners of representation for conscious states. They argue that these manners of representation are reducible to physical or functional properties, such as functional roles or evolutionary histories. For Tye (1995, 2000), a phenomenal manner of representation requires the representation to be poised for direct control of action (to be poised to affect beliefs, desires and other conceptual states). On this view, phenomenal states have certain poisedness to impact the cognition; that is, they supply information to the cognitive system.

For concreteness, I will assume Tye's PANIC theory (1995, 2000), on which conscious perceptual states are states that are appropriately poised for the use of the cognitive system, with abstract nonconceptual intentional content. A mental state is phenomenally conscious just in case it has a PANIC state. Mental states that differ in their PANIC states differ in their phenomenal character. In Tye's view, phenomenal character is a non-conceptual representational content. It means that our perceptual experiences of sounds, shapes, colors, and tastes do not require concepts. Our color experiences, for instance, vary far from the discriminating color concepts we have. Although phenomenal experiences are non-conceptual, they must be poised to an immediate cognitive effect; the information they carry on must be cognitively available. Tye claims that states with phenomenal character are poised, that is, "arise at the interface of the non-conceptual and conceptual domains and (...) stand ready and available to make a direct impact on beliefs and desires" (2000, p. 62). Phenomenal representations, distinct from non-phenomenal ones, require the presence of appropriate poised, abstract, non-conceptual representational states. Thus, phenomenally conscious states are states with this type of content.

In this framework, to determine whether infants' perceptual states are conscious, we need to determine whether they satisfy the PANIC condition. That is, we need to determine whether

infants' perceptual states are poised, with abstract nonconceptual intentional content. I have already argued that infants have states that represent the world, so they have intentional content. Thus, we need to determine whether they meet three other conditions: (1) abstract; (2) non-conceptual; (3) poised. I will address the question whether infants' perceptual states meet those conditions.

The first condition is the relevant content be abstract. That is, particular concrete objects do not "enter" into the phenomenal character; it is the representation of general abstract features of the object that is involved in the phenomenal content. Tye's main reason for the abstractness condition is to accommodate two cases: 1) hallucination, in which no object is perceived, though the experience represents the object as being perceived; 2) different concrete objects that look or feel the same phenomenally (see e.g., Tye 1995, chapter 5; and Tye 2000, chapter 3).

Tye's abstractness condition is controversial. Naïve realists,[51] for example, would deny this condition; they argue that perceptual content involves concrete objects. Furthermore, abstractness might fail as a condition for consciousness, as objected by Kriegel (2002). Kriegel claims that abstractness is a weak candidate to differentiate states with phenomenal character (such as experiential states) and states without phenomenal character (such as propositional attitudes) because propositional attitudes are also abstract and intentional. The crucial difference between phenomenal states and propositional attitudes involves only the content being non-conceptual and poised to make a cognitive difference.

It is difficult to analyze infants' perceptual states for the abstractness condition. If we consider the case of hallucination, where the subject experiences an absent object, it is plausible to claim that infants could have hallucinations. For example, if we stimulate their retina or visual cortex appropriately, as in the case of closed-eye hallucination[52] or if they are under influence of psychedelics, it is plausible that they will have similar hallucinatory experiences as adults. However, it is very difficult to find this experimentally.

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[51] Unlike intentionalists that hold that the phenomenal character of the experience is constituted by a representational relation, naïve realists hold that what is fundamental to experience is something which itself cannot be explained in terms of representing the world. Naïve realists claim that, in the cases of veridical perception where one genuinely perceives an ordinary object, such experiences consist of primitive relations of awareness to objects.

[52] One example is the phenomenon of phosphene. Phosphene is characterized by the experience of seeing light with eyes closed without light entering in the eye. Phosphene can be induced by mechanical stimulation of the retina (e.g. rubbing or applying pressure on or near the closed eyes) or visual cortex (stimulation of neurons).

Another case is the case of perceiving different concrete objects that can give the same phenomenal experience (e.g., perceiving two numerically different red balls). The capacity of having the same phenomenal experience with numerically different objects is probably the basis of the habituation-novelty paradigm used for assessing mental processes in infancy. In this paradigm, infants feel bored with same and familiar stimuli, they compare the currently available stimulus with a remembered stimulus: when similarity is detected infants' looking time decreases. When infants are presented to a visual stimulus, and then, they are presented again to a similar stimulus, for example, when a baby looks at one red ball, and then, to another red ball, they can look at the different balls as if they are the same object, they detect the invariant patterns of the stimuli, and they react with lack of interest to the second red ball. The two perceptual states "looking at red $ball_1$" and "looking at the red $ball_2$" produce the same experience, they represent the world as being the same way. However, if they are presented with a new stimulus, for example, they look at a green ball, they regain the interest and the attention to the object. This case shows that infants are capable of detecting similarities or "sameness" of experiences (see the notion of "sense of sameness" proposed by Philippe Rochat (2011)). This is at least some indication that the same perceptual state can be produced in infants by different objects. Assuming that the same state has the same intentional content, this suggests that the intentional content may be abstract rather than concrete.

The second condition is nonconceptuality. The idea is that representational content does not need to be a conceptual content. The subject can phenomenally represent an object without possessing any concept of the represented properties of the object. Tye's nonconceptuality condition aims to accommodate the richness of the content of perceptual experience. A subject (with linguistic abilities) can experience a particular shade of red – say, red_{29} – even if she lacks the concept of red_{29} and even if she cannot recognize or store in her memory the representation of that particular shade of red. Our capacities for perceptual discrimination are much more fine-grained than our conceptual and memory capacities. Thus, the perceptual content does not involve concepts.

There is a debate between conceptualists, who think that all representations are conceptual, and nonconceptualists, who think there is nonconceptual content. Conceptualists argue that there is no sharp division between cognition and perception, and some perceptual representations of properties are analogs of concepts (Spelke 1990; Gennaro 2012). Nonconceptualists argue that

perception is nonconceptual and nonpropositional, and perceptual representations are not concepts (Peacocke 2014; Bermudez 1998). My focus here is how conceptualist and nonconceptualist positions might help to clarify the conditions for conscious perception in infants.

José L. Bermudez (1998) is a nonconceptualist who argues for the autonomy of nonconceptual content. Bermudez's autonomy thesis claims that a subject could be in states of nonconceptual content while not possessing any concepts at all. Developmental explanations of the acquisition of concepts involve transitions from prior states with nonconceptual content to those with conceptual content. Supporters of the autonomy thesis argue that the interrelated capacities to represent the world (e.g., to represent the spatial configuration of the environment) and to represent oneself (e.g., one's own location in the environment) are independent of the conceptual level, and do not require possessing any concepts.

Some advocates of nonconceptual content have applied the notion to distinguish representational states of non-linguistic animal and pre-linguistic infants from representational states of linguistic adults. On one view, concepts require language, and pre-linguistic infants do not possess concept, so all their representational content is nonconceptual. However, the connection between nonconceptual content and language is imperfect. There can be nonconceptual content even in creatures with language. The condition is that the sensory experience of a property, for example a shape property, does not *require* the possession of the concept of 'shape', even in cases of adult subjects that possess linguistic abilities. On some views, there can also be conceptual content without language. Thus, the question is whether infants' perceptual states nonconceptually represent properties of perceived objects.

Infants' perceptual states seems to meet the nonconceptuality condition. It has been suggested that newborns and pre-linguistics infants have experiences with nonconceptual contents, which means that they represent the world without deploying any concepts (Bermudez 1998). Infants seem to lack shape and size concepts, but they still represent shape and size. At birth, infants have shape and size constancy. They represent shape and size as invariant features of objects; they perceive objects as maintaining their shape and size over motion. Regardless of changes in objects' orientation, infants have the ability to perceive the constant, real shape of an object that is rotated in the third dimension (see Slater & Morison 1985). They also perceive real

size of objects over changes in distance (see Slater, Mattock & Brown 1990). Infants seem to lack object concepts, but they represent object permanence. Young infants are able to represent object unity and boundaries; they are able to perceptually organize their visual array into unitary and persisting objects (Spelke 1990). For instance, in the drawbridge experiment,[53] Renée Baillargeon (1986) shows that infants are able to identify a particular object and track the motion of this particular objects, and then they exhibit certain expectations regarding the motion and persistence of objects behind occlusions.

Are these representations nonconceptual? On one widespread view, infants do not possess any concepts, so if they are able to represent anything, they represent it nonconceptually. Then, we can conclude that they meet the nonconceptuality condition.

However, there are also some views on which infants possess concepts, and on which their representations are conceptual.

For example, Elizabeth Spelke (1990) holds an intermediate view on which these perceptual abilities are explained by infant's capacity to form a representation of the visual surface layout and the presence of mechanisms which follow four basic principles of cohesion, boundedness, rigidity, and no action at a distance. Spelke (1990) claims that those principles might be central to human perception of objects and motion. On Spelke's view these perceptual representations are continuous with cognitive representations involving concepts.

As another example, Rocco Gennaro (2012) argues that there are implicit cognitive processes underlying infants' conscious experiences that allow them to distinguish one mental state from another and to form rudimentary thoughts using those mental states. He argues that infants acquire a concept by applying demonstrative concepts (this or that) to their feelings. Gennaro claims:

> "An infant (or even fetus) can quickly acquire a (primitive) concept of PAIN by applying THIS or THAT to certain unpleasant feelings. These feelings will reoccur, and so an infant will recognize and reidentify them over TIME via concepts like SAME and DIFFERENT. Infants will thus acquire concepts such as HURT, which is surely a central feature of PAIN." (Gennaro 2012, p.224-5).

[53] In the drawbridge experiment, an infant is habituated to see a screen rotates 180°, and is dishabituated when the screen 'passes through' an object placed behind it. The dishabituation reflects the infant's expectation that the screen's rotation will be blocked by the occluded object (Baillargeon 1986).

Gennaro argues that the ability to recognize and reidentify similar features of recurring mental states need not be conscious. This view might explain a variety of conscious experiences infants might have during their development when each of the core concepts emerges; additionally, it might explain how concept acquisition might contribute to boost the development of consciousness. A challenge for Gennaro's conceptualism is how to explain basic conscious sensory representations at birth before infants (or fetus) achieve any demonstrative capacity. Forming demonstrative concepts requires a sophisticated ability that infants (or fetus) might not have.[54]

These conceptualist views are highly controversial. On the most common view, infants' perceptual representation is nonconceptual. Furthermore, if infants' perceptual representations are conceptual, then almost certainly adults' perceptual representations are conceptual too. If so, then Tye's nonconceptuality condition for consciousness is almost certainly wrong. If the condition is wrong, then the conceptuality of infant representations will not pose an obstacle to those representations being conscious.

To sum up, we can conclude that (i) plausibly, perception in infants is nonconceptual, so it meets Tye's nonconceptuality condition for consciousness; (ii) if this is wrong and perception in infants is conceptual, then perception in adults is also conceptual and Tye's nonconceptuality condition for consciousness is wrong.

The third condition is that the content be *appropriately poised* for use in rational control and action. This idea is that phenomenal experiences play a distinctive functional role. More specifically, Tye claims that "experiences and feelings, *qua* bearers of phenomenal character (...) stand ready and available to make a direct impact on beliefs and/or desires." (2000, p. 62).

According to Tye (1995), when we have a perceptual experience (e.g., seeing a red apple), our sensory systems sensorily represent external environmental properties (e.g., surface color or distance way). Sensory representations serve as inputs to processes in our cognitive systems. Those sensory representations are also the outputs of our specialized sensory modules (in the case

[54] For a defense of nonconceptual content and a criticism of the conceptualist view see Adina Roskies (2008). The conceptualist view entails that the content of our experience is limited by the concepts that we possess. So, having the experiences should presuppose already having concepts. If the nature of our experience is entirely conceptual, then all perceptual concepts must be innate, and we cannot account for concept learning. Roskies claims that the conceptualist view results in a strong version of nativism that is incompatible with naturalistic accounts of concept learning.

of perception: auditory, visual, olfactory, gustatory, and tactile modules). The sensory modules generate a sort of "internal" representation that supply information the creature needs to generate a sensory representation. In Tye's view, the phenomenal content is not part of any process occurring within the sensory modules. Phenomenal content arises at the level of the outputs from the sensory modules and of the inputs to a cognitive system. The same process occurs in the case of bodily sensations, moods, and emotions. The relevant content of conscious states (the phenomenal content) is the content that is appropriately poised for use by the cognitive system. The sensory representations supply the inputs for cognitive processes to generate beliefs or desires (e.g., red apple in front of me; wanting to reach red apple). Perceptual experiences differ from beliefs and desires in their functional role and their intentional contents.

The question is whether infants' perceptual representations are poised for rational control and action in Tye's sense. Infants are still developing their cognitive systems, so perhaps, not all perceptual representations that are available to us may yet be available to them. But they seem to have a variety of perceptual states that are directly accessible to the relevant cognitive centers and to action control. As an illustration, I will focus on perception of spatial location, and the role this perception plays in action.

Young infants represent the spatial configuration of the environment and they represent the location of an object in their visual field. At birth, newborns have the ability to track with their eyes and try to reach an object that moves close in their visual field (Rochat 2015). Infants less than one-month old successfully reach a stationary object guided by spatial-temporal visual information; and by four months of age, infants successfully reach (grasp or touch) a stationary and a moving object (von Hofsten 1983). The ability of catching a moving object involves eye-hand coordination – as the infant has to move her arm guided by the visual information of the location of the object; and the ability to anticipate the trajectory and future locations of the moving object. Reaching a moving object requires that the visual representation of tracking different spatial locations of an object be poised for action control. Infant's future action must anticipate the states of the world which will be obtained when the actions take place (von Hofsten et al 1998).

Young infants also perceptually represent the spatial location of an approaching object which risks to collide with their heads in their trajectory. Infants aged two to eleven weeks manifest

head withdrawal, and upset and avoidant behavior (moving her head back and away from the screen and brought her arms toward her face) when exposed to the expansion of an optic array that specifies the impending collision of an object (Ball & Tronick 1971; Rochat 2011). These results suggest that the content of infants' visual representation (spatially locating an approaching object) is appropriately poised to be used by their cognitive system for action control, both in reaching behavior and in avoidance behavior. If so, then Tye's third condition is also met by perceptual representations of space in infants.

To sum up, developmental research suggests that infants' perceptual states meet Tye's conditions for PANIC states. The content of their perceptual representations is abstract, nonconceptual and poised for action control. So at least given Tye's theory, this suggests that infants' perceptual representations are conscious.

The same conclusion could also be argued using other conditions for consciousness: for example, Chalmers' condition that contents must be globally available for the control of action (Chalmers 1996). The results about spatial perception above show that spatial contents are available for multiple different sorts of control of action, which is strong evidence of global availability. So, given Chalmers' condition, this also suggests that infants' perceptual representations are conscious.

2.3 Color Experience and Causal Representationalism

In this section I will discuss color experience in infants, and I will use it to make an argument against one version of representationalism, causal representationalism. Causal representationalism is a view on which phenomenal experiences are representations of external properties that have previously been causally connected to the associated brain states. My conclusion is limited as causal representationalism is not the most popular form of representationalism. Nevertheless, this argument shows how considerations about infant consciousness can have impact on philosophical issues about the nature of consciousness.

In what follows I outline an argument from newborn experience against causal representationalism. I will focus the investigation in the relation between visual phenomenal properties (particularly, color visual properties) and representational properties, in the hopes of

extending this analyze to perceptual phenomenal properties in general. I will assess the phenomenological evidence from developmental research against causal representationalism and I will discuss potential objections that might support a causal representationalist view.

My argument runs as follows. If causal representationalism is true, then newborns have experiences of colors only if their associated states have been causally connected to colors. I will present empirical data suggesting newborns have experiences of color before their brains have been causally connected to colors. If so, causal representationalism is false. I will focus here on color experiences, but the same argument might work for other conscious experiences such as shape, size, form, and sound experiences.

What is the nature of color experience? Conscious experiences have a phenomenal character. There is something it is like for you to be in a certain conscious state. The specific way in which it is like for you to be in a conscious state is the phenomenal character of your experience. Color experience is a conscious experience. In reading these words, you are currently having a visual experience of black letters with a particular shape printed on a white paper. When you look at a tree full of leaves illuminated by the sun, you have an experience of different shades of green. Having an experience of green is an experience with a phenomenal character. There is something that it is like for you to see these particular shades of green. This phenomenal character is sometimes called phenomenal greenness.

Color experience has representational content. Visual color experiences represent colors in the world. For example, a color experience may represent an object as having a particular shade of green. Greenness is the property an object is represented to have when it looks green. A visual color state might have the content of, e.g., "there is a green object in front of me." This mental content represents the external color property greenness.

Consciousness involves the instantiation of phenomenal properties and representational properties. At first glance, phenomenal properties and representational properties are connected. To understand the nature of color experience we have to understand the connection between these both aspects: the phenomenal character and the representational content of color conscious states. Whenever there is something it is like to see green, that state has specific phenomenal properties, e.g., phenomenal greenness.

Representationalism analyzes conscious states as a kind of intentional state. According to representationalism, all conscious experiences have a constitutive representational structure. Every phenomenal property is identical to a certain representational property. When we have a color experience, such as the experience of seeing green, the phenomenal greenness of the experience is identical to the property of representing external greenness (in an appropriate way). The property of representing an external object in an appropriate way is the property of representing a certain intentional content in a certain manner.

There are different versions of representationalism (Chalmers 2010). One useful distinction here is between reductive and non-reductive representationalism. Following Chalmers' definition, "reductive representationalism holds that phenomenal properties are identical to certain pure or impure representational properties that can be understood without appeal to phenomenal notions. Non-reductive representationalism holds that phenomenal properties are identical to certain pure or impure representational properties, where these cannot be understood without appeal to phenomenal notions." (Chalmers 2010). A pure representational property is the property of representing certain intentional content; and an impure representational property is the property of representing certain intentional content in a certain manner. Causal representationalism is usually understood as a sort of reductive representationalism.

I will focus my arguments in a particular type of representationalism: causal representationalism. It is a version of tracking representationalism. Tracking representationalism is a view developed by William Lycan (1996), Fred Dretske (1995) and Michael Tye (1995, 2000), on which phenomenal experiences are representations of external properties that they "track" in some fashion.

Representationalism can be combined with different theories of what it is to have representational content. Representationalists (such as Dretske 1995, Tye 1995, Lycan 1996) usually appeal to an account of mental representation in causal, informational and teleological terms. Causal representationalism combines representationalism with a causal theory of mental content.

The causal theory of content is a popular theory of representational content (Dretske 1981, Fodor 1990, Millikan 1984). The causal theory of mental content hold that a concept's meaning is causally related to what the concept represents. What the concept represents is a function of

causal relations between mental representations and their external objects (Rupert 2008).[55] According to Fodor (1990), causal relations hold in virtue of laws of nature. There is a law-like relation between physical properties and the representational content. Let us say, the mental representation GREEN (as psychological structure) is nomically connected to the physical property green; GREEN represents only green objects, and green objects cause tokenings of GREEN.

The causal theory of content claims that a state represents a certain property if and only if it is causally connected to this property in an appropriate way. In the case of color experience, the representational content involves physical properties – such as surface reflectance properties – e.g., a visual color state represents greenness if and only if it is causally connected to the physical greenness. As the causal theory of content claims, a state represents a certain property if and only if it has an appropriate *causal/historical* connection to that property. It means that, in the past, that state was normally caused by that property. Considering the case of color representation, a brain state represents a color property (a physical property such as physical greenness), if that brain state was caused by that color property (physical greenness) in previous causal interactions.

Causal representationalism is a strategy that results from combining representationalism with the causal theory of content. First, representationalism accounts for phenomenal consciousness in terms of intentionality. Second, the causal theory of content accounts for intentionality in terms of a tracking relation to the environment. Putting these together, causal representationalism accounts for phenomenal consciousness in terms of a tracking relation to the environment.

In the case of color experiences, representationalism affirms that phenomenal greenness is identical to the property of representing the external greenness (in an appropriate way). The causal theory of content holds that representing external greenness is identical to being causally or historically connected to external greenness. The combination of these two views results in the idea proposed by tracking representationalism: the phenomenal greenness of color experience is the property of being causally and historically connected to external greenness (in an appropriate way). A brain state has phenomenal greenness if and only if it has been caused by physical greenness in the past. Phenomenal experiences represent external properties that have previously been causally connected to the associated brain states.

[55] There are different versions of causal theory of mental content, each one argues for different ways in which mental content and properties are connected (Rupert 2008).

There are forms of tracking representationalism that are not causal representationalism: for example, Tye's optimal-conditions representationalism, and Dretske's teleological representationalism. There are also internalist forms of representationalism that are not forms of tracking representationalism. I will discuss these forms later. For now, my argument is limited to causal representationalism.

The objection that I will raise against causal representationalism is that there can be properties represented in the subject's experience even if she has not been in causal connection with instances of those properties before. The case of color experience in newborns babies illustrates this.

Do newborns represent colors? Right from birth, newborns can see. They can't see as well as older children or adults, because their visual systems aren't fully developed. Newborns see little, because they can't focus their eyes well, and they concentrate mostly on objects within 8 to 10 inches of their face. Infants at birth do not have stereopsis, what limits their depth perception; and by the second month, they develop full depth perception and the ability to perceive three-dimensionally. Their vision improves rapidly over the next six months, when they learn how to focus and to improve visual accuracy. Over the first year of life, they learn how to use the visual information the eyes send to the brain in order to represent the world. Similarly color perception and luminance are not fully developed before six months when babies start perceiving colors in adult-like manner. Despite the fact that their visual system is not completely developed, it seems that newborns do have color experiences; they're sensitive to chromatic stimulus and luminance stimulus at birth.

While the evidence of newborns' color experience is compatible with a representationalist viewpoint, this poses a *prima facie* problem for causal representationalism. Causal representationalism cannot explain the presence of color experiences at birth. The evidence of colors experience at birth shows that there are color properties that are represented in newborns' color experiences even if they have not been in causal contact of those properties before. According to causal representationalism, this could happen only if in normal conditions that type of experience is tokened because these things are the case. But it seems that it is not possible for newborns to be in contact with color properties before birth, and then this necessary condition cannot be met.

We can construct the argument against causal representationalism like this:

(i) Newborns have color experiences.

(ii) In newborns, visual states do not have a causal and a historical connection to physical color.

(iii) If causal representationalism is true, then all color experiences involve visual states with a causal and historical connection to physical color.

(iv) Conclusion: causal representationalism is false.

The first premise (i) can be supported by research on infant visual perception (Hudak *et al.* 2013). The main question here is what and how can we know about infant color experience. I will use three empirical cases that suggest newborns have phenomenal color experience: 1) color vision in newborns; 2) color illusions; 3) neonatal synaesthesia.

Color Vision in Newborns

My discussion on newborns' color experience does not rely on any particular theory of color. The case of newborns' color experiences might be problematic for any theory that adopts a sort of phenomenal externalism. There are many theories that try to explain what sort of properties colors are (objectivism, primitivism, realism, eliminativism, dispositionalism, relationalism). I will assume that newborns' color experience (say phenomenal redness) represent a property of a particular color (say red), and this fact may be true independently of the way color property is conceived (as a mind-independent property; as a mind-dependent property). Nevertheless, newborns' color experiences might be a problem for a structuralist view of colors, in which the subject does not represent a color property, what the subject does represent is a relational property, that is a relation between two properties. I will discuss this view on the next section.

Hudak, Jakab and Kovacs (2013) present several studies on the development of infant color vision – mainly research on perceptual integration and multisensory development, and neonatal synesthesia — that suggest that color perception development relies on genetically programmed maturation. This seems to support the claim that newborns' color experience occurs

independently of early perceptual learning and independently of a causal connection with physical properties (surface reflectance properties, in the case of color perception) of physical objects.

For many years, it had been argued that infants were born colorblind. Recently, data from infant vision research suggest that some aspects of color vision are functional at birth, though it takes some months for their color vision become adultlike. Although they have a limited and poor color experience comparing to adults' color experience, it is widely accepted that newborns can experience some colors (Maurer et al. 1989). They have the ability to discriminate chromatic from achromatic stimuli; they can discriminate red, green or yellow from gray (Adams et al. 1986; Lewis & Maurer 2009).[56] Luminance and chromatic contrast sensitivities are thought to be mediated by the magnocellular (M) and parvocellular (P) visual pathways respectively. Nevertheless, newborn do not have the same degree of maturation of the color perception systems we observe in adults to detect chromatic stimulus (the parvocellular pathway), so their discriminatory capacity is not well developed though some studies indicate the possibility that they use other systems to discern colors (magnocellular pathway) (Bosworth & Dobkins 2013).

Two chromatic mechanisms are functional at birth, what suggest that newborns are, at least, dichromats. In the first two months of infant vision development, these limitations are overcome rapidly and by three-four months their color vision shifts to normal trichromats spectral sensitivity.

Preferential looking is an observable behavior that a baby does when they see a stimulus that is very interesting next to a stimulus that is not interesting. Babies prefer systematically to look at a stimulus that is interesting rather than to look at a not interesting stimulus. Researchers used modifications of preferential looking paradigm to study behavioral visual color function in babies. In the forced-choice preferential looking paradigm, two circles have been cut out of a large gray field. They are on opposite sides of and equidistant from the midline of the large field. In the center there is a small peephole, which allows the observer to see the test subject, babies were shown a red field in a gray surround. We can test that for color perception or vision acuity.

[56] Color perception is organized in three dimensions –brightness, hue and saturation; it is often represented diagrammatically in a "color solid" that encompasses all possible chromatic experiences. Brightness is perceived luminance and lightness. Hue is the percept of color that corresponds to a physically dominant wavelength, and it is identified with the "redness," "yellowness," "greenness," or "blueness" of color. Saturation is the subjective density of color in a mixture (Bornstein 2015).

Infants prefer to look at a colored stimulus on one side of a display rather than a blank, homogeneous field on the opposite side. Babies shortly after birth performed above chance in this paradigm, using contrast of red, green and, further in development with blue color (Teller et al. 1978).

Color illusions in infants. Another way to test color experience is to investigate color illusions or errors in color perception. The idea is that if infant's color perception can be deceived by color illusion as the adult is, it suggests that the baby's color visual mechanism is enough developed in an early age to allow the infant to have color experience. Yang and collaborators (2009, 2010) have been studying color illusions in infants, and they showed that infants are capable to perceive these illusions, suggesting that they have color experience. In the Munker-White illusion (Yang et al. 2010), the subjects are faced with two rows of pink rectangles that are physically of the same color. However, the right row of pink rectangles, surrounded by more gray, looks more saturated than the right row. Babies by four-eight months are capable of perceiving that illusion. As adults, infants prefer high subjective saturation. In the Neon Color Spreading illusion, the color of a figure spreads outside the figure's boundaries and forms a transparent surface (Yang et al. 2009). In the figure, the areas around the blue circles of intersections are physically uniform white. However, a bluish veiling disk spreading in a neon-like manner is perceived around the blue circles. Two perceptual phenomenal effects can be perceived: the color spreading and the illusory contour that surrounded the color spreading area. Babies by three-six months old are capable of perceiving that illusion, and show preference for neon color spreading condition (Yang et al. 2010). Those studies do not include newborn subjects (the perception of those effects requires a specific visual cortex maturation still absent in newborns), but it suggests that quite early infants present similar perceptual experiences that do not depend on perceptual learning or previous historical connection.

Newborn Synaesthesia.[57] Data from research on neonatal synaesthesia (Wagner & Dobkins 2011) also confirm the claim that newborns have visual color experience. Wagner and Dobkins (2011) hypothesis is that early development is characterized by high neural connectivity that may facilitate arbitrary sensory experiences in infants, and those atypical experiences are unlike anything experienced by typical adults but are similar to the sensory experiences of adults with

[57] Synaesthesia is a rare sensory phenomenon that has been associated with exuberant neural connectivity and that is characterized by strong arbitrary associations between different sensations.

synaesthesia. Newborns experience arbitrary correlations between colors and shapes that are not associated with any relation that resulted from perceptual learning. Researchers presented infants with images of repeating shapes (either circles or triangles) on a split-color background: one side was red or blue, and the other side was yellow or green. The hypothesis was that if the infants had shape-color associations, the shapes would affect their color preferences. They predicted that some infants might look significantly longer at a green background with circles than at the same green background with triangles. Otherwise, if this were a case of absent synaesthesia, no such color preference would be visible. The study confirmed this hypothesis. Infants with two-months-old showed significant shape-color associations. By eight months the preference was no longer pronounced, and in adults it has gone altogether.

The second premise (ii) claims that in newborns, visual states do not have a causal or historical connection to physical color. Newborns were not previously connected to physical colors before birth. They do not see color in the womb; their eyes are sensitive manly to light and dark. The womb is dark, and light or visual color experience is not needed to vision development until birth at term. By week 28 of gestation, infant will be able to differentiate between light and dark and will be following a light source with his eyes by week 30. By week 37 of gestation, infants start to turn towards light, but they still do not see colors before birth.

These data seem to support the claim that newborns' color vision occurs independently of early perceptual learning and independently of a causal connection with physical properties (surface reflectance properties, in the case of color perception) of physical objects. There is a debate in the visual scientific field about the different contributions of visual experience (perceptual learning) and the genetic preprogrammed mechanisms on vision development. The issue is whether early visual experience in the beginning of life significantly alters visual color development. It's often assumed that early visual experience during the early neonatal period has no effect on visual maturation of color vision, which is instead driven by genetically biological factors. The ability to discriminate colors is already there at birth, and the further development of color perception seems to emerge on the grounds of genetically preprogrammed maturation. The scenario is quite different for some other visual abilities. They found different results for perception of form, shape and three-dimension world, and perception of motion. Those abilities are highly influenced by visual experience and perceptual learning.

A causal representationalist could reply to the argument by denying premises (i), (ii), or (iii).

The causal representationalist could deny premise (i) by saying that newborns only have color reactions, not color experiences. On this view, color perception by newborns could be unaccompanied by phenomenal states (experiences): they could be mere discriminations as in the case of blindsighter's perceptions. If this is the case, then the fact that newborns perceive colors does not speak against the thesis that phenomenal consciousness (for instance, the experience of phenomenal greenness) requires previous causal interactions with the corresponding properties (for instances, green surfaces).

However, it is not plausible not to attribute phenomenal states to newborns. First of all, it has been argued that they are generally phenomenally conscious (they have, for instance, pain experiences). Also, cases of unconscious perceptions of certain properties by blindsighters occur against the background of phenomenal consciousness of discriminations of *other* properties. I have argued already that there is good reason to think that newborns have conscious visual experiences, and those reasons apply to color experiences. For example, color representations in infants seems to be poised for the control of behavior. So there is good reason to think that newborns' perception of color is conscious.

If there is any doubt, we can escape this objection altogether by making the same argument with newly sighted adults. It seems quite clear that they have color experiences, as they report this. It also seems clear that they had no previous causal connection to colors. Children born blind and having their sight restored after an extended period of blindness have severe difficulties with form perception and navigation in space, but their ability to perceive color is much less affected. Researchers (Hudak et al 2013) have tested babies with abnormal visual input since birth due to congenital cataracts, and have showed that: 1) color experience appears almost immediately, including normal levels of chromatic resolution; 2) recognition memory for color develops quite fast; 3) color experience is well integrated with what is available of form recognition and cross-modal perception.

They could deny premise (ii) by arguing that there are causal connections in the womb between visual brain areas and color properties. However, in the womb, a fetus sometimes is sensitive to light and dark, but not to colors. They react to light and dark in the womb but not to chromatic stimuli. Unlike audition or taste, vision color capabilities present at birth have

developed prenatally in the absence of color experience connected to the external environment. If that is the case, then before a baby is born, there is no appropriate causal connection between visual states and colors.

A representationalist could also deny premise (iii) by denying that if causal representationalism is true, then all color experiences involve visual states with a causal and historical connection to physical color. This premise is hard to deny, as causal representationalism has been defined in terms of causal and historical connections. However, this objection raises another possible response for a representationalist: defend a form of representationalism different from causal representationalism that is not vulnerable to this argument. I will examine responses of this sort in the following section.

2.4 Implications for Representationalism

This leads to a more general reaction, which is to defend an alternative version of representationalism. The argument against causal representationalism does not threaten representationalism in general. It only threatens representationalism combined with a causal theory of content. Internalist versions of representationalism do not face the same objection. Other externalist views, such as teleological and optimal-conditions representationalism, may also escape this objection.

I will start with externalist forms of representationalism. There are two kinds of externalist theories of content that aim to explain what it is to represent a property (Rupert 2008). One theory is the causal theory of mental content proposed by Fodor (1990), according to which we represent properties we're causally connected to. The other one is the teleological theory of content proposed by Millikan (1984), according to which we represent properties we are evolutionarily connected to. On this theory, a state represents what it was evolutionarily selected to indicate. Speaking broadly, representationalism combined with those different theories of mental content gives rises to two different types of external representationalism. Causal representationalism combines representationalism with the causal theory of content. In this view, to have a color experience (phenomenal greenness) is to be causally connected to color properties (physical greenness). Teleological representationalism combines representationalism with the

teleological theory of the content. On this view, to have a color experience (phenomenal greenness) is to be evolutionarily connected to color properties (physical greenness).

In general, representationalism holds that intentionality derives from a tracking relation; what is called tracking representationalism. Intentionality is a matter of detecting, carrying information about, or correlating with features of the environment. There are different ways of characterizing the tracking theory. The investigation focuses on two types of tracking relation: actual-causal tracking and counterfactual-causal tracking.

Actual-causal theory: the representational content is whatever *has caused* the experience in the past. It considers the past history of interactions of the creature. This is the theory relevant to what I have called causal representationalism.

Counterfactual-causal theory: the representational content is not whatever has caused it in the past, but it is whatever *would have caused* it under normal or optimal conditions. It does not entail that anything actually has caused it.

The actual-causal theory considers the subject's causal history to determine the intentional content of her mental representations. It requires what Robert Rupert calls *actual-history requirement*: "for *R* to represent *Q*, some *Q*s must actually have caused some *R*-tokenings in the subject in question" (Rupert 2008, p.362). Many philosophers adopt a form of actual-history-based approach including Robert Rupert (2008, 2013) and Fred Dretske (1981, 1988).

Fred Dretske has proposed two theories of content: a causal-informational semantics theory (1981) and a teleological theory (1988). Despite variations on the way a subject's mental content is causally determined, both Dretske's theories embraces the actual-history requirement: there is an actual learning period in the developmental history of the individual. In the informational theory, Dretske (1981) posits a learning period during which the semantic content is fixed. In the teleological theory, he posits a learning period in which an indicator (a mental structure that has the function of indicating/ detecting a property) can acquire a function within the cognitive system. As Rupert (2013) notices, Dretske's view comes with the cost of precluding innate representations. Dretske defends a representationalist view of consciousness, where perceptual experiences are representations, that is, "their phenomenal character (…) are completely given by the properties the experience represents things to have" (Dretske 2003, p.67). In this sense,

experiences are representations and, consequently, their contents are also causally determined by the actual-history of the individual.

Rupert (2013) proposes a causal developmental theory. In his approach, what a subject can represent depends on what objects the subject have interacted with in the past; that is, a subject's mental state M can represent X if and only if the subject has causally interacted with X in her developmental history. In Rupert's view, the intentional content is determined by the subject's developmental interaction with the environment: "a mental representation is about whatever kind or property is the most efficient cause of that mental representation" (2013, p.142). The efficiency of a cause is measured by comparisons between past relative frequencies of certain causal interactions.

So, consider the case of color experiences, say the experience of seeing a particular shade of green. In Rupert's view, an infant's phenomenal state *P* (say PHENOMENAL GREENESS) represents *G* (a shade of GREEN), if G (a shade of GREEN) has actually caused some tokenings of *P* (PHENOMENAL GREENESS) in the infant's actual past history. The content of the representation will be fixed by the infant's developmental interaction with shades of GREEN in her environment. In Ruppert's account the colors a subject represents depends on what surface reflectances the subject has interacted with in her past history. Rupert's actual-history account rules out any experience of color before infants' brain's states are *actually* causally connected with colors; and this requirement rules out any color experience at birth.

The counterfactual causal theory considers that a mental state represents X if X *would* cause that state under normal or optimal conditions. This requirement does not imply that X has *actually* caused that state in the past. A newborn's phenomenal state can represent X even if the newborn has never encountered X before. For this reason, newborns' color experience might not be a problem for counterfactual causal theories.

Tye's tracking representationalism relies on counterfactual causes. According to Tye, the causal connections that matter to phenomenal content "are those that *would obtain*, were optimal or normal conditions operative" (2000, p.64). Tye claims that an experience S of a creature c represents that *P* just in case: "if optimal conditions were to obtain, S would be tokened in c if and only if *P* were the case; moreover, in these circumstances, S would be tokened in c because *P* is the case" (2000, p.136). On this view experiences represent properties that *would cause* them

under optimal or normal conditions. It is possible that these properties never actually caused the mental states, if optimal or normal conditions never obtained.

The issue depends on the way we define what are those conditions. Tye's (2000) suggests a theory of tracking in terms of two distinct notions: "optimal conditions" or "normal conditions". This suggests two possible interpretations of those conditions. The first is a statistical notion, tied to statistical normality, where normal conditions are the conditions most common in the life history of the organism. The second is a teleological notion, tied to evolutionary history, where optimal conditions are understood in terms of the conditions that the perceptual system was designed to function in (for discussion see Pautz 2006).[58]

The construal of optimal conditions in terms of design leads to a teleological theory. Tye gives a teleological interpretation of optimal conditions, defining them as the conditions our perceptual systems were *designed* by natural selection to operate in. He explains what are the optimal conditions in terms of the design: "In the case of evolved creatures, it is natural to hold that such conditions for vision involve the various components of the visual system operating as they were designed to do in the sort of external environment in which they were designed to operate" (Tye, 2000, p.138). This sort of optimality leads to teleological representationalism. As discussed before, teleological representationalism does not preclude infants of having color experiences at birth, so, it is not threatened by newborns' color experiences.

The construal of normal conditions involves statistically normal lighting conditions and the normal operation of the visual system. This is the case of the normal or ideal perceiver. This sort of optimality leads to a sort of causal-tracking representationalism. If optimality is understood in statistical terms, it can lead to the sort of problems I discussed for causal representationalism.

There are two possible interpretations of statistically normal conditions. One is the conditions that are statistically normal in the life of the individual organism; another is the

[58] In *Ten Problems of Consciousness* and *Consciousness, Color, and Content*, Tye's theory is formulated considering both notions "normal conditions" or "optimal conditions". Here are two passages where he affirms this: "The initial, or input, representations for the visual module track light intensity and wavelength, assuming nothing is malfunctioning. The output representations track features of distal stimuli under optimal or ideal perceptual conditions" (Tye 1995, p.103); and another passage "There are many different theories about the nature of representation, but one approach that seems well suited to sensory representations (although not to beliefs) is the causal covariation view. On this view, if optimal or ideal perceptual conditions obtain, sensory states of the sort found in perception track the presence of certain external features; they thereby represent those features. The causal connections that matter to phenomenal content, I suggest, are those that *would* obtain, *were* optimal or normal conditions operative." (Tye 2000, p.64).

conditions across some broader population (say, the species to which the organism belongs, including mature members of the species and perhaps long-dead members of the species). On the view that "normal" conditions are understood as relativized to a broader population, newborns' color experience might not be a problem. The tracking representationalist might have a reply to the challenge: the infant represents greenness in virtue of being in a state (type) which is normally produced by physical redness throughout the infant's species, even if it has never been produced by redness in the infant herself. However, it is quite unclear which broader population is relevant for representing a property, and why this population should be relevant for phenomenal experience.

On the view that normal conditions are understood as those which are statistically normal for the individual organism, the case of newborns' color experiences is a problem. On this view, the normal conditions are the most common conditions for the individual in her past history. In the case of newborns, their most common conditions are the conditions of their past history in the womb. In the womb, newborns (the fetuses) have not had interaction with color, so when they encounter (say) a green object in the outside world, it is the first time it is interacting with physical green. Consider the first moment a newborn is exposed to colors. Here, the condition that is statistically normal for the infant is the condition in the womb. Thus, under this version of the optimal-conditions account, the newborns' state represents whatever property would have caused it under the conditions in the womb. However, under the conditions in the womb, physical greenness would not have caused the brain state. Thus, the brain state does not represent physical greenness.

We can see that if optimal-conditions representationalism is combined with an account of statistical normality in terms of actual causes in an organism's life history, then this theory is vulnerable to the objection from newborn color experience. However, if it is combined with an account of statistical normality in terms of causes in a broader population, then it is not. And if optimal conditions are understood teleologically, then, it is not. So Tye's tracking representationalism, can escape the objection as long as optimal conditions are understood in terms of a broader population or in terms of teleology. Of these two views, the teleological view seems preferable since otherwise it is unclear what counts as the broader population.

The teleological view seems to be confirmed by the focus on phylogeny in this passage:

> "It seems plausible to suppose that for creatures like us, creatures with an evolutionary history, the phenomenal character of states like feeling pain or having a visual sensation of red is phylogenetically fixed. On this view, through learning we can change our beliefs, our thoughts, our judgments, but not (by and large) how things look and feel (in the phenomenal sense of these terms). (…) Once the receptor cells are matured, it suffices to open the eyes. No learning or training is involved. The phenomenal appearances are nonconceptual. Small children see pretty much what the rest of us see. Things look phenomenally to them pretty much as they do to adults". (Tye 2000, p. 56)

Unlike causal representationalism, teleological representationalism does not require a previous causal connection between colors experience in the lifetime of the baby, it just requires a connection in its evolutionary history. So, the objection I have raised does not threaten teleological representationalism.

For similar reasons, it does not threaten internalist representationalism. For these versions, representation of a property dos not depend on environmental connections to that property. Instead it depends on the internal state of an organism. For these views, the absence of an environmental connection to colors is not an objection to the view.

However, it remains a serious problem for causal representationalists. The upshot is that representationalists should be internalist representationalists or teleological representationalists, not causal representationalists.

Chapter 3

Consciousness of Agency

This chapter addresses the question whether newborn babies have experiences of agency. Recent advances in developmental psychology can help us to address important questions about the nature of the early stages of consciousness. What is the structure of a newborn baby's consciousness? Do they have intentional agency? Do they have experiences of agency: that is, do they have experience of themselves as a conscious agent?

I argue that babies have experiences of agency at birth. Specifically, I argue that while not all actions of babies involve agency experience, some actions do. I present evidence from developmental psychology for this thesis, and I address objections.

An important objection to the thesis that newborn babies have agency experience is that agency experience involves a higher-order attribution of agency generated by a high-level cognitive mechanism, which requires self-consciousness and a self-concept, and that babies lack the capacity for self-consciousness and a self-concept. In the absence of these capacities, babies can be at best aware of certain actions they perform and not of their own agency in those actions.

This chapter presents an intermediate view on which the experience of agency requires nonconceptual self-representation but not a self-concept. More specifically, it requires what Peacocke (2014) calls "degree-1 of self-representation," which involves mental states with nonconceptual *de se* content (nonconceptual representation of oneself), but not "degree-2 of self-representation," which requires conceptual first person thought (conceptual representation of oneself). I will also argue that although newborn babies may lack degree-2 of self-representation (conceptual self-consciousness), they have degree-1 of self-representation. If these claims are right, the lack of conceptual self-consciousness is no obstacle to the claim that babies have agency experience.

On this view, the sense of agency requires more than the action awareness enjoyed by the creature at "degree-0 of self-representation," where the conscious subject represents the world but does not represent itself. I will argue that some actions involve only degree-0 of self-

representation while others involve degree-1 of self-representation, and that consequently some but not all actions in babies involve the experience of agency.

This chapter presents empirical data suggesting newborns have experience of agency and that they have these experiences before they develop the ability to entertain first person conceptual thoughts. Recent data concerning agency in newborns – mainly research on neonatal imitation, action systems oriented to goals, agency representation – suggest that agency experience is present at birth, but there is no evidence for first-person conceptual thought at birth. This seems to support the claim that newborns' agency experience occurs independently of the capacity for first person conceptual thoughts. I will use this developmental data to reject the view that agency experience requires conceptual self-consciousness.

3.1 Do Newborn Babies Have Experiences of Agency?

The experience of agency is a common feature of our daily life. We are all familiar with the experience of having a desire (e.g., the desire to drink a glass of water), forming an intention (e.g., the intention to drink a glass of water), and acting based on this intention (e.g., the act of moving your arm to grasp a glass and to drink the water inside the glass). At least in many cases, when an action is performed by a conscious subject, the subject has the experience of acting (of performing an action) which, in this particular case, is exemplified by the feelings of grasping and drinking a glass of water. In addition, we often experience ourselves drinking the glass of water or grasping the glass of water. We do not merely perceive our bodies and the glass of water and then form the belief that we are drinking a glass of water. Although there are pathological cases (e.g., anarchic hand and schizophrenic delusions of thought-insertion and alien control) where subjects lack a sense of agency, in our daily life an experience of agency is associated with a variety of actions. Roughly speaking, the sense of agency is the feeling that we have of being the author of ours own actions.

The sense of agency has recently been challenged by some skeptical views. Empirical work on the sense of agency has questioned whether our experience of agency plays any causal or epistemic role in guiding our actions. This work shows that people's judgments of agency can be affected and manipulated by external variables, and this can result in a reduced or lack of feelings of agency. Based partly on these experimental results, some philosophers have been arguing that

the sense of agency is an illusion, and that in fact we are not in a conscious control of our own actions. This illusionist view allows that we have a sense of agency but denies that it plays a role in controlling action. Other philosophers (e.g., Chadha 2016; Ganeri 2015; Prinz 2007) have raised doubts about the very existence of a sense of agency. They argue that there is no positive phenomenology associated with agency.

This skepticism can come in two varieties: skepticism about agency and skepticism about voluntary control. The skeptics about agency deny the existence of the phenomenology of agency; They argue that there is no self as a subject of experiences or as an agent of actions, consequently there is no sense of agency. They deny that there is something like being an agent in the sense that there is no experiential phenomenology associated with agency. Defenders of the no-self view (such as Monima Chadha and Jornadon Ganeri) also deny the existence of self. The skeptics about will claim that the sense of agency is a positive feeling, but this feeling is an illusion that we are in control of our actions, because our will is causally inert.

Despite those skeptical views, many philosophers have argued for a positive phenomenology associated with first person experience of agency, what Bayne and Levy (2006) call the phenomenology of first person agency. In this thesis, I will accept the positive view. I will not discuss whether the experience of agency has in fact a causal role in guiding all our actions, but I will presuppose that the sense of agency exists.

My main focus is the question of whether the sense of agency is present in newborn babies. Newborn babies are born with a variety of motor abilities, among them, the ability to grasp objects. However, when a two-month-old baby raises her arm in the direction of a colourful object that appears in proximal distance of her visual field, and tries to grasp the object, is this baby having an experience of agency? That is, does the baby have a phenomenal experience of the grasping and of her role in grasping the object? This is a challenging question.

I will use empirical data about action in infants as well as philosophical analysis to argue that newborn babies have experiences of agency, and they have experiences of themselves as conscious agents. Specifically, I argue that while not all actions of babies involve agency experience, some actions do.

In the next section, I further clarify the distinction between agency and sense of agency and I present the basic elements of agency experience. Second, I lay out experimental results that tend

to suggest that newborns have experience of agency. Then I will describe some theoretical models of agency experience: high-level and low-level theories of the psychological mechanisms involved in agency experience. I argue for a pluralist view of agency experience on which each of these theories correctly describes certain aspects of agency experience. I conclude that newborn babies have at least low-level although not high-level aspects of agency experience. Then I will address some skeptical challenges, and I will end with some concluding speculations on the stages of self-consciousness.

3.2 Agency and Sense of Agency

There is no consensus in philosophy about how to define the sense of agency (Mylopoulos & Shepherd forthcoming). It is important to make some clarificatory distinctions about agency and sense of agency. I start with agency. In a broad sense, an agent is a creature with the capacity to act, and agency is the manifestation of this capacity. There are different ways to understand the relation between the agent and the action she performs.

The standard view in philosophy of action defines agency as the capacity to perform intentional actions; and intentional action is defined in terms of the causation by the agent's mental states (desires, intentions, will) (Anscombe 1957; Davidson 1963). In this view, action is to be explained in terms of intentions: something is an action if it is generated by an intentional state of the agent and this intentional state rationalizes the action from the agent's point of view. This view allows us to understand rational agency. However, it fails to capture some of the features of human agency and it may exclude cases of genuine agency that do not (necessarily) involve rational intentional action, such as animal action and early stages of human actions. To understand early stages of human actions, we need a notion of agency that goes beyond the desire-belief version proposed by Davidson (1963).

The capacity for action is present in even relatively simple organisms: a fish swimming; a bird building a nest; a baby sucking her mother's breast; a child playing games. As Burge (2010) suggests, there is a basic sense in which agency involves just the capacity for coordinated movements that involve the whole organism, such as a fish swimming around its prey. More complex forms of agency emerge later in evolutionary history.

It is useful to distinguish three grades of agency: primitive agency, goal-directed agency, and reflective agency. Primitive agency is the capacity to perform self-generated and coordinated movements in response to stimulation from the environment. Primitive agency can be present in simple organisms that have sensory capacities but cannot represent goals. It is involved in basic biological activities such as eating, navigating, mating, parenting, and instinct-based actions including reflexes and automatic responses.

Goal-directed agency is the capacity for action directed toward a goal, caused by a mental state that represents the goal. This state does not necessarily involve a propositional content (such as desires, intentions, will); it might be a low-level representation of the action's goal (such as an image-like representation). This kind of agency is present in creatures (animals and humans) that have perceptual capacities and possess representational mental states, and are able to represent a goal.

Reflective agency is the capacity to perform actions for certain reasons, being fully aware of and reflectively evaluating those reasons. Actions are caused by a desire and a higher-order state (e.g., second-order desire) that endorses acting from that desire. This is a kind of agency present in human agents that are able to reflect on and introspect about their motivations.

This notion can explain sophisticated agency that involves second-order attitudes and a planning agent, but it fails to capture other cases of genuine human agency, as well as animal agency and the early stages of human agency. To explain agency in animals, one needs the notion of primitive agency – as Burge (2010) has argued – and of goal-directed agency.

What about newborns? Newborns display a range of primitive actions, so they have primitive agency. I will shortly present evidence that babies perform actions directed at goals, suggesting that they may have goal-directed agency. However, it is arguable that they lack the higher-order states required for reflective agency. In this chapter, I will use the term agency to be referring to primitive and/or goal-directed agency; and I will specify when I use agency referring to reflective agency.

The main topic here is not agency but the sense of agency. Sense of agency involves a conscious experience. Neither primitive agency nor goal-directed agency entails that the agent performing the action is conscious of itself as an agent. It is perhaps plausible that most creatures

capable of goal-directed agency are conscious beings, but this does not immediately entail that they are conscious of their agency.

Sense of agency (or equivantly, agency experience, the experience of agency, or agentive awareness) is the conscious experience that the agent is performing an action. There is a clear phenomenological contrast between being aware of actively performing an action and being aware of having your body being passively moved.

Following Bayne and Pacherie (2006), I distinguish two aspects that might be involved in the experience of agency: the phenomenology and the representational content. The phenomenology of agency involves the feeling of ourselves as performing an action. The representational content is some specification of the action performed (e.g., the experience of myself moving my arm; the experience of myself performing such and such action).

There are multiple forms of experience of agency discussed in the literature. Bayne (2008, 2010) suggests that the phenomenology of first person agency is composed of core and noncore elements. The core elements involve essential elements such as the sense of oneself performing an action (e.g., the experience of oneself as acting, as moving the body in a certain way) and some specification of the type of the action that the sense of agency is for. It might also involve a sense of initiation and a sense of control. It might involve a sense of what it is that one is doing: moving the body in a certain way; performing a certain type of action; or acting with a certain goal. Noncore elements involve elements that do not need to be present within an experience of agency, such as experiences of effort, experiences of freedom, volition, deliberation, awareness of intention and mental causation.

I will focus on the core elements of agency experience here. If any experience of agency is present at birth, it very likelly involves just core elements and its minimal structure of phenomenal character and representational content. It does not involve the experience of deliberation, decision, the awareness of a goal or a will, the awareness of physical effort, or other noncore elements.

We sometimes perform an action without being aware of performing the action, as when we drive a car in a familiar road. Although we are conscious of driving the car we are not fully aware of all the movements we are performing in driving the car. However, often when we perform an action we are aware of acting in some way. Furthermore**,** we can also perform an

action and, simultaneously, be aware of acting and be aware of ourselves performing the action. In this case, we aware of the action performed and we are aware of ourselves as the author of the action. It seems that performing an action can be associated with different types of conscious mental states.

We should distinguish four types of mental states that might be involved or not in the minimal structure of the experience of agency: feeling-awareness; action-awareness; agency-awareness; experience-awareness.

Feeling-awareness is whatever evaluative state (emotions, moods), that can be associated with any conscious mental state or that can be present when we perform an action: feelings of joy and pleasure; feelings of frustration or anger; feelings of tiredness or excitement; feelings of passivity or activity. The experience here may simply involve a feeling (e.g., excitement, exhaustion) without any specification of an associated action.

Action-awareness is the awareness of what one is doing, without any representation of one's role in performing the action. It might be a partial and unespecific content of the conscious representation of acting. The content of such state can be something like 'riding a bike,' 'eating an apple,' or 'ducking the head.' It is the experience of a particular action and it does not necessarily involve any self-representation.

Agency-awareness (experience of agency) involves more than just action-awareness. Agency-awareness involves the sense of ourselves as performing an action ('the experience of myself grasping an object'). The content of such state can be 'I am riding a bike;' 'an object is being grasped by myself,' 'I am moving my legs in such and such way.' Agency-awareness always involves some self representation with a *de se* content. It may involve or not first-person concepts.

Experience-awareness is the awareness of having an experience. We can distinguish between having an experience of acting and being aware of having the experience. The content of such state can be 'I am conscious of having this experience of riding a bike.' It is a reflexive state, and it involves the subject being aware of her own mental state.

Those four mental states can come separately or can come together; and they are associated to different cognitive capacities. The focus here will especially be primarily on agency

awareness, and secondarily, on action awareness. I will argue that newborns have both action-awareness and agency-awareness. I will not argue that they have experience-awareness.

3.3 Evidence About Agency in Newborns

Empirical research on newborns' behaviors has explored a variety of aspects of agency in newborns.

The traditional view in developmental psychology posits that newborns' conscious states are undifferentiated, disorganized and passive. They experienced what William James (1890/1981) called "a blooming, buzzing, confusion." Theorists were reluctant to attribute organized affective and phenomenal experience to newborns. This picture has been greatly revised by recent developmental research (Rochat 2004, 2011, 2015). The current consensus is that babies have a minimal awareness of their own bodies. They experience their body as oriented, differentiated, bounded, and organized. They are born with the capacity for detecting similarities and reacting to novelty. They experience emotions and feelings (including pain and pleasure) about themselves and events in the environment.

At birth, infants present at least three kinds of behaviors involving three sorts of systems (Rochat 2015). First, reflex systems involve automatic responses triggered by specific stimulations of the environment (e.g., the beating of the heart; movements of the lung in breathing; knee-jerk response; the blinking of eyelids in response to air puff). The control of such movements is endogenous, controlled by a feedback system. Second, action systems involve bodily movements oriented toward functional goals and resources in the environment: food, protection, comfort. Third, motivational systems involve affective systems and relational systems. The affective systems involve feelings of pleasure and displeasure present in both physical and social interactions. From the age of two-three months, infants show a system of actions oriented toward particular resources with affective values. The relational systems involve a bidirectional regulation in mother–infant communication, where each partner regulates one's own state.

The action systems are present at birth and prominent at 6 weeks of life. They involve flexible behaviors under the control of previous experience, capable of changing based on

learning experience, and adjusting to novelty. Those actions systems comprehend a variety of behaviors such as rooting response, sucking breast or pacifiers, head turning, grasping objects, eye tracking and attempting to reach objects, intentional actions toward objects and people.

If we examine the range of actions newborns are able to perform there is little doubt that they are agents and they perform actions oriented to a goal. Infants' action systems described above involve goal-directed agency, that is, it involves having a goal that guides the action performed and the direction of the perceptual attention toward the goal.

However, are newborns aware of their own agency? I will first consider whether is plausible to attribute any kind of self-representation in newborns' actions, and later in this section I will consider whether this self-representation is conscious or not. I will focus on the research on intentional actions toward objects and people that might involve the representation of infants own agency, and I will consider whether this evidence might suggest that infants represent their own agency.

The most well-known case, although highly controversial, is neonatal imitation. Since Meltzoff and Moore (1977) first reported that infants between 12-21 days of age can imitate a range of facial and manual gestures, it has been well documented that neonates show behaviors of tongue protrusion and tongue retraction, as well as mouth opening and lip protrusion at birth. For the last 40 years it has been widely accepted that those findings suggest an inborn capacity for imitation. Although Meltzoff and Moore's evidence of neonatal imitation has been widely accepted, detractors of their view have been questioned the reproducibility of the results and the experimental methodology applied. Recently a comprehensive longitudinal study conducted by Oostenbroek and colleagues (2016) has failed to find any evidence that newborns can imitate facial gestures, hand movements or vocalizations. In the experiment they tested infants at 1, 3, 6, and 9 weeks, presenting nine social and two non-social models including facial gestures, hand gestures and vocal gestures. The results indicated that infants did not imitate any of models' gestures. They were likely to produce the gestures in response to control as they were to matching models. These negative results have been considered a pivotal response against the hypothesis that imitation is an inborn capacity genetically inherited, and favoring the opposite hypothesis that imitation is a learning process (Heyes 2016).

Despite the controversy around neonatal imitation (whether it is a genetically inherited capacity or a learning process), it has been widely documented that neonates produce facial gestures such as tongue protrusion and retraction; and they produce those gestures both spontaneously and when caregivers model those behaviors. Newborns protrude their tongues more often when observing tongue protrusion than when observing alternative actions; and they also protrude their tongues in response to a range of arousing stimuli. This behavior cannot be explained in terms of conditioning or innate releasing mechanisms. What might be the better interpretation for this behavior? There are two interpretations of those facial behaviors: the imitation-hypothesis (the standard explanation) and the stereotype (motor-control)-hypothesis.

The imitation hypothesis developped by Meltzoff and Moore (1977) claims that newborns can imitate facial and manual gestures. Neonates can equate their own unseen behaviors with gestures they see others perform. Imitation is a matching-to-target process. The behavioral target is specified visually; infants self-produce movements to match the gestures of the human model, and those movements provide proprioceptive feedback that can be compared to the visually specified target. According to Meltzoff (2007), such comparison is possible because infants are born with a 'supramodal' representational system that registers the perception of the adult behavior target and the production of the infants' own movements. If this hypothesis is correct, in neonatal imitation infants represent their performed action and also represent the visually perceived model's action and they are able to compare both of actions. Infants must be able to distinguish the externally-perceived-action from the self-generated-action, otherwiese they would not be able to control their self-produced movements to match model's gestures. This suggests that infants are able to represent their actions as their own actions. This can be seen as the beginning of the representation of agency.

More recently Keven and Akins (2016) have been arguing against the imitation-hypothesis. They interpret the presence of these spontaneous oro-facial behaviors in neonates as "aerodigestive stereotypes." Aerodigestive stereotypes is a set of rhythmic motor sequences that emerge as the first structured behaviors in human gestation and play a crucial role in aerodigestive development. Although those facial gestures involve representation of goal-directed actions ('sucking the breast,' 'protruding the tongue'), it is not clear whether or not they involve any self-representation. However, after six-eight weeks of life, others goal-directed actions associated with those facial gestures emerge (see the next evidence presented) that

involves self-representation. These facial gestures either are the first area of motor-control development, which might be necessary for the development of the capacity of performing goal-directed actions, or either they are involved in neonatal imitation which might involve a degree of self-representation. If there is any sense of agency in infants, it might be associated with those facial gestures.

The second case comes from the research on infants' oral actions toward objects. Rochat and Striano (2000) show that infants can discriminate the congruence or incongruence of contingent auditory feedback associated with their own actions. They measured babies' sucking activity on a dummy pacifier (the pressure and frequency of the infants' sucking). The dummy pacifier was connected to a sound machine. When the baby sucks the pacifier, it produces an auditory feedback (that can be congruent or incongruent sound). Infants modulate their sucking depending on the auditory feedback they have. They generate more low frequency and wider sucks when the pattern of sounds was contingent with the infant's sucking. By two-months-old, infants are engaged in exploring their own agency and the effects of their own action (Rochat & Striano 2000). In this experiment, infants seem to detect a causal connection between their own actions (sucking activity) and the effects of their acitons in the environment (the auditory feedback). It is arguable that they represent their own agency in understanding that it is via changing the pattern of their sucking activity that they can get the congruent auditory feedback.

The third case involves expectations about actions. From the age of 2-3 months, infants are capable of instrumenting their body to produce effects on objects and people. A pioneer study proposed by Roovie Colier and Hayne (2000) shows that young infants are able to learn how to activate a music box or to move a mobile above the crib using a string attached to one of their legs. They expect consequential events to happen following their own self-generated actions, producing leg movements. They express joy and interest when they succeed in causing the auditory and visual event; and they manifest frustration and anger when the string attached to their legs is disconnected from the box and the expected events do not follow. (Roovie Colier & Hayne 2000). In the leg-kicking paradigm, infants seem to represent their own actions (leg-kicking) and the effects of their actions, allowing them to understand the causal connection between both events. They also develop expectations about their actions, and they express feelings of joy and anger associated with outcome of their actions. This suggests that they are at least representing their actions and possibly their own role in causing their actions.

The fourth case is the still-face paradigm that involves face-to-face interactions. Between two and six months infants develop social expectations as well as means to act as a function of these expectations to control their social environment. If caregivers engage in face-to-face interaction with them, infants expect a certain level of reciprocity in the exchange. They manifest negative affects and disengagement following communicative disruption such as a sudden still-face from the partner (Tronick et al. 1978). In this case, babies seem to manifest awareness of an interaction between two agents (herself and the caregiver).

The still-face paradigm and others strongly suggest that infants represent agency in others. Susan Carey (2009) conducted a series of study that shows that infants by five-months are able to attribute agency to inanimate and animate creatures. They represent goal-directed actions and they represent the gaze-following as the agent's attentional focus; and they are able to generate integrated representations of agency (the agent's goals and the agent's attentional states), allowing a teleological construal of events.

These results do not directly involve infants' self-representation, but it is plausible that the capacity to represent agency in others and in oneself are closely connected. Given that babies can represent agency in others, it would be surprising if they could not represent it in themselves. In the still-face paradigm, babies seem to manifest awareness of an interaction between two agents (herself and the caregiver).

Taking the evidence together, it provides at least an initial case that infants represent their own agency. More strongly, it tends to suggest that infants are aware of their own agency. Given that infants are conscious beings (as I have argued in Chapter 1), there is not much reason to suppose that their representations of their agency is unconscious. When infants are perfoming actions, they display a range of gestures and facial expressions similar to those adults display: they are awake, they express feelings associated to the outcome of their actions, they are attentive and focus their attention of the outcome of the action, they get bored and they show positive reactions to novelty and surprise.

All this leads to the following natural picture of agency experience in newborns. Newborns are aware of their actions and they are aware of their own role in initiating an action. They experience motor control of their actions and the associated pleasure of control. They experience reinforcing pleasures by getting feedback of their actions on things and people. They experience

pleasure in carrying out an intention, a form of pleasure possible only for creatures aware of themselves as agents.

To see whether or not this picture is correct, we need to look more deeply at the nature of agency experience.

3.4 Theories of Agency

A number of models have been proposed to explain how the experience of agency is generated. These models fall into two main groups, corresponding to two general accounts of the experience of agency grounded in two different psychological mechanisms: the high-level accounts and the low-level accounts.

The high-level accounts explain the experience of agency in terms of high-level cognitive processes, such as causal inference, deliberation and reflective attribution of agency. The high-level accounts of agency are narrative-based accounts (Bayne & Pacherie 2007), where the explanations of the agency judgments are based on the agent's narrative self-conception. The most common high-level account of agency is the cognitive reconstruction account. The sense of agency is subserved by a holistic mechanism that is concerned with narrative self-understanding. High-level cognitive mechanisms include central interpretive systems that explain our awareness of our own agency. This high-level mechanism is postdictive, and the sense of agency is an effect inferred after the performance of the action. In this model, the experience of agency is linked to reflexive cognitive attribution of agency.

The low-level accounts explain the experience of agency in terms of low-level mental processes, such as perception and representation of body movements (as in motor control) and goals. The most common low-level account is the motor prediction account. This model involves low-level mechanisms such as the perception and execution of action. On this account the sense of agency is generated by low-level mechanisms that exploit sensorimotor cues related to action performed, that allows the subject to predict the action. The experience of agency results from the integration of three elements: 1) the agent's intention; 2) the sensory feedback of the action performed; 3) and the perceptual information of the effects of the action. The

experience of agency is linked to the intentional aspect (task, goal), and bodily movements (motor control) produced in perfoming an action.

How are these accounts relevant to experience in newborns? The low-level accounts tend to suggest that newborns have agency experience, because newborns have the low-level mechanisms that the account requires. The high-level accounts are less friendly to agency in newborns, because newborns may not have the high-level cognitive mechanisms that the accounts require. One important distinction between both accounts is what those account aim to explain. As Bayne and Pacherie note (2007), the high level accounts seem to be more suited to explain the sense of agency in terms of judgments of agency, that is, self-ascription of propositional attitudes that rely on first-person mind-reading systems; the low-level accounts seem to be more suited to explain the experience of agency, the sensations, affective states and perceptions associated to actions.

To see how babies might satisfy low-level accounts of agency experience, we can examine one of the most influential low-level accounts: the comparator model developed by Chris Frith and colleagues (2000a, 2000b). In the comparator model, the experience of agency is produced by three contributory elements: (1) efferent signals that send motor commands to the muscle system; (2) a sensory feedback (visual and proprioceptive/ kinesthetic information that tells me that I am moving); (3) intentional feedback (my perceptual sense that my action is having an effect).

One of the results in favor of the comparator model comes from the observation that we cannot tickle ourselves. This general phenomenon is referred by Blackmore and colleagues (1999) as *sensory attenuation.* To investigate this phenomenon they observed whether participants would report a difference between a "self-generated" touch and an "externally-generated" touch. In the sensory attenuation paradigm, the participants are exposed to two conditions: the self-generated condition, and the externally-generated condition. In the self-generated condition, participants use their left hand to control a "tickling device" to touch their right palm. In the externally-generated condition, the experimenter controls the device to touch the participants in the same place on their right palm. They report that on average, participants judge the self-generated tactile stimuli to be *less* tickly, intense, and pleasant than those that are externally generated.

There is some evidence that newborn babies have the ability to distinguish between tactile stimulation that are either self- or not self-produced; and this perceptual capacity may function as a similar adults' low-level comparator mechanisms. Rochat and Hespos (1997) tested newborn infants within 24 hours of their birth to see whether they would manifest a discrimination between double touch stimulation specifying themselves, and external tactile stimulation specifying no-self objects. They use the rooting response[59] of newborns to test whether newborns can discriminate stimuli that are self-generated from externally-generated. They recorded the frequency of rooting in response to either external tactile stimulation, the experimenter stroking the infant's cheek, or in response to tactile self-stimulation when infants spontaneously brought one of their hands in contact with their cheek. They found that newborns tended to manifest rooting responses almost three times more often in response to external compared to self-stimulation. They conclude that already at birth, "infants pick up the intermodal invariants (single touch or double touch combined with proprioception) that specify self- versus external stimulation, showing evidence of an early sense of their own body, hence an early perceptually-based sense of themselves as differentiated entities." (Rochat & Striano 2000, p.516). Infants can discriminate between self-produced tactile stimulation and externally-generated tactile stimulation.

3.5 A Pluralist View of Agency Experience

I support a pluralist view of agency experience. I think that there are multiple components of the experience of agency that might involve both low-level and high-level accounts of agency experience. The low- and high-level accounts explain different aspects of agency experience. The best view is a pluralistic account (or integrative or multiple approach) – that holds that the experience of agency might involve inferential and sensorial-motor mechanisms. Low-level accounts are accounts of simple (nonconceptual) agency experience which involves nonconceptual self-consciousness. High-level accounts are accounts of complex (conceptual) agency experience, e.g., narrative models, which involves conceptual self-consciousness.

[59] The rooting response is an ability infants manifest from birth and by which tactile stimulation at the corner of the mouth is followed by the infant's head turn with mouth opening toward the stimulation (Rochat & Hespos 1997).

On the pluralist view, newborns have nonconceptual agency experience but not conceptual agency experience. Conceptual agency experience comes later in development. So while newborn babies lack sophisticated forms of agency experience, they have the most primitive forms: they have basic phenomenal awareness of their actions and their agency. Conceptual self-consciousness requires the mastery of the first person concept. Nonconceptual self-consciousness requires a nonconceptual first person content and psychological states with nonconceptual content (Bermudez 1998) or *de se* content (Peacocke 2014).

Newborn babies have both action-awareness (which does not require self-consciousness) and nonconceptual agency-awareness (which requires nonconceptual self-consciousness). They do not have conceptual agency-awareness, which requires conceptual self-consciousness and comes later in development. For example, a newborn trying to grasp an object in her visual field may have nonconceptual phenomenal awareness of her action with the following contents: 1) 'the object is being grasped;' 2) '*i* am grasping the object;' 3) 'the object is being grasped by *me'* (or 'by *my* hand'). However, the infant will not have conceptual phenomenal awareness of those contents.

The notion of a nonconceptual experience of agency is in agreement with Peacocke's degree 1 of self-representation. My account on nonconceptual agency-awareness will be an elaboration of Peacocke's account. In *The Mirror of The World*, Peacocke develops an account of first person content, as a kind of intentional content, that features in a variety of conceptual and nonconceptual content of perception, memory and action-awareness. The first-person content is a sort of *de se* content[60], and for Peacocke (2014), the possession of de se content necessarily involves the "possession of a subject's mental file on itself, and an integrating apparatus that operates to generate representations in the subject's file on itself." In addition, Peacocke distinguishes three degrees or levels of involvement of the first-person content. His main idea is that there are distinct degrees of self-representations, ranging from a primitive level with no involvement of self-representation, to a more sophisticated level that involves conceptual representation. At degree 0 of self-representation, subjects represent objects and events around a

[60] One central example of *de se* content was formulated by John Perry in this famous passage: "I once followed a trail of sugar on a supermarket floor, pushing my cart down the aisle on one side of a tall counter and back down the aisle on the other, seeking the shopper with the torn sack to tell him he was making a mess. With each trip around the counter, the trail became thicker. But I seemed unable to catch up. Finally, it dawned on me. I was the shopper I was trying to catch... I believed at the outset that the shopper with a torn sack was making a mess. And I was right. But I didn't believe that I was making a mess. That seems to be something I came to believe." (Perry 1979, p.3)

location, but do not employ the first-person notion. At degree 1, subjects employ a non-conceptual version of the first-person; they enjoy states with *de se* content. At degree 2, they employ the conceptual first person, expressed by the first-person pronoun "I."

According to Peacocke (2016), what distinguishes degree 1 from degree 0 is the subject's ability to ascribe to itself actions. At degree 1 of self-representation, the subjects' abilities involve ascription to itself of actions, and this brings first-person content into the referential content of the subject's representational states. Peacocke has proposed other representational capacities that are involved the subject's ability of self-representing: 1) subjects experience their own body; 2) subjects are sensitive to another subject's representing them as an agent; 3) subjects represent the other as registering information about one's own actions; 4) subjects display emotions about oneself; 5) evaluative emotions about another's actions.

There is an analogy between Peacocke's agency-account and the nonconceptual agency experience I propose.

3.6 Addressing Skeptical Challenges

The idea of agency-awareness in infants faces at least three skeptical challenges: skepticism about infant consciousness, skepticism about infant self-consciousness, and skepticism about primitive agency-awareness.

Agency experience is a conscious experience and it entails phenomenal awareness, which is accessible only from the first-person point of view. Our best evidence for phenomenal awareness in other humans is typically a first-person report. So, those that are skepticals about conscious phenomenal experience in the absence of first person report can also raise doubts about infant's conscious experience.

Skepticals about infant consciousness argue that newborns lack phenomenal consciousness. One common reason for skepticism is that infants lack the capacity for higher-order thoughts or other higher-order representations of their mental states. According to higher-order theories of consciousness, these higher-order states are required for phenomenal consciousness. If infants lack these higher-order states, they lack phenomenal consciousness.

One way to resist to infant consciousness skepticism is to argue that consciousness does not require higher-order thoughts (I develop this argument in the first chapter). Infants lack higher-order capacities such as introspective thoughts and autobiographical memory, but this does not mean that they lack a conscious subjective life. Infants have a rich sensory phenomenology (with lack of sensorial integration); they experience positive and negative feelings.

One can also positively argue for infant consciousness by appealing to no-report data that suggest the presence of consciousness in infants. Recent empirical research shows that a minimal ability of experience feelings is present at birth, or even before. Infants also display the capacity to have emotions (face expressions) and they experience pleasure by getting feedback regarding the impact of one's own actions on people and things.

Another challenge is skepticism about infant self-consciousness. Even those that accept that infants are conscious might be skeptical about infant self-consciousness. Infants may be conscious of the world but they are not conscious of themselves. They lack a first-person self-concept, so they lack the capacity for self-representation and self-consciousness.

In reply, we can distinguish conceptual self-consciousness from nonconceptual self-consciousness. Nonconceptual self-consciousness requires primitive self-representation, it does not require a self-concept. Although it is arguable that babies lack a self-concept, there is much evidence that babies have self-representation. So the lack of a self-concept is not an obstacle to self-consciousness in infants.

The third sort of skepticism is skepticism about agency-awareness. Full agency experience requires awareness of the self's role in action, and this requires self-consciousness and/or a self-concept, which babies don't have. Without self-consciousness, babies might have only action-awareness, not full agency experience. This generates an important objection to agency experience in newborns: agency experience involves a higher-order attribution of agency generated by a high-level cognitive mechanism, which requires self-consciousness and a self-concept, and babies lack the capacity for self-consciousness and a self-concept. In the absence of these capacities, babies can be at best aware of certain actions they perform and not of their own agency in those actions.

Full agency experience requires self-consciousness, but nonconceptual self-consciousness suffices (nonconceptual *de se* content). Even if babies lack a self concept, they plausibly have

nonconceptual self-consciousness. There is strong evidence that babies can represent action and agency in other people. Given that babies are aware of themselves and of action and agency in others, it would be surprising if they were not aware of agency and action in themselves. Arguably consciousness of one's action is the most basic form of self-consciousness.

The overall picture is that newborn babies have both action-awareness (which does not require self-consciousness) and non-conceptual agency-awareness (which requires nonconceptual self-consciousness). They do not have conceptual agency experience, which requires conceptual self-consciousness and comes later in development. A newborn grasping an object will have nonconceptual phenomenal awareness of, for example, 1) 'the object is being grasped'; 2) *i* (*de se* content) am grasping the object; 3) the object is being grasped by *me* (by *my* hand). Nevertheless, it will not have conceptual awareness of those things expressed by I-thoughts ('I am grasping the object').

4.7. Concluding Speculations: Stages of Self-Consciousness

What can the phenomenology of agency tell us about the nature of self-consciousness? If the pluralist account is right, and the non-conceptual sense of agency emerges earlier than the conceptual sense of agency, this might tell us something about the nature of early conscious states. In particular, it suggests that there are stages of consciousness and self-consciousness. Conscious experience changes during development from an initial basic structure to a more complex one.

These stages of consciousness correlate with degrees of self-representation. Peacocke (2014) suggested three degrees of self-representation. In degree zero, the subject represents events, objects and processes taking place around (a perceptual point of origin). They represent the world, but do not self-represent. In degree one: the subject has mental states with first person *de se* content, but only of a nonconceptual kind. In degree two, the subject enjoys mental states containing the first person conceptual concept. In Peacocke's account, those degrees of self-representing are not necessarily associated with any conscious experience. The system can be able to represent itself without being self-conscious of the self-representation.

In applying those degrees of self-representation to the content of agency-awareness, we can have the following degrees. In degree zero, creatures are capable of action-awareness, with the following content "Arm is moving." In degree one, creatures are capable of nonconceptual-agency-awareness, with the follwoing mental content "Moving my arm to grasp an object." In degree two, creatures are capable of conceptual-agency-awareness, with the following mental content "I am moving my arm to grasp an apple."

I claim that infants have Peacocke's degree one of self-representation, with nonconceptual *de se* states. I also claim that this nonconceptual *de se* states, in cases of infants are performing an action, are often conscious. Infants have nonconceptual self-consciousness and their sense of agency involves nonconceptual agency experience.

Chapter 4

Empathy and the Development of Morality

This chapter is devoted to the development of morality in humans, with a focus on the role of empathy in moral development. It has often been suggested that aspects of the self and personal identity form the foundation of morality (Reid 1785/150). Moral questions about agency, free will, autonomy and responsibility have been often explored by narrative accounts of the self that emphasize the crucial role of higher-level cognition, such as autobiographical memory and psychological continuity. Fewer studies have investigated the role of lower-level cognition and other mental components, such as perception, sensorimotor actions, affective states and consciousness in morality.

I will explore the role of empathy in understanding intentional actions, and its relationship with moral agency. I will also explore the development of moral emotions (particularly empathy) and moral reasoning. In this way, I hope to better understand the role of empathy and self-consciousness in the development of a moral sense and moral agency.

4.1 Empathy and Morality

A prevailing view in moral psychology holds that the cognitive abilities of empathy and affective perspective-taking play key roles in morality and in prosocial and altruistic behaviors. According to numerous psychologists (Eisenberg & Strayer 1987; Batson et al. 1981; Batson & Shaw 1991; Zahn-Waxler & Radke-Yarrow 1990; Hoffman 2000; Vaish et al. 2009, 2011; Decety 2004) and philosophers (Hume 1739/1978; Smith 1759/2009; Slote 2010; Goldman 2006; Darwall 1998; de Vignemont & Frith 2008), empathy is fundamental to morality.

Recently, Jesse Prinz (2005, 2011a, 2011b) has challenged this trend in moral psychology. Prinz has two major theses. First, he argues that empathy is not a necessary precondition for moral approval and disapproval. Second, he argues that empathy is prone to biases that render it potentially harmful and frequently produce morally undesirable results. His conclusions are that

empathy plays no essential role in morality and that it interferes negatively with the ends of morality; therefore, it should not be cultivated.

I argue against both theses in "In defense of empathy: A response to Prinz" (2015). First, I argue that empathy plays a necessary role in human moral development. I argue that empathy – understood either as vicarious sharing of emotion or as affective perspective-shifting through simulation and imaginative reconstruction – is fundamental to the development of moral agency. The absence or deficiency of these processes leads to the absence or deficiency of a crucial element of our morality. Second, I argue that there is a moral benefit associated with empathic feelings. I also argue that there are certain morally demanding situations in which empathy is our best guide to moral judgment.

For the purposes of the thesis, this chapter will present the argument that empathy is necessary for morality. I spell out Prinz's negative view of an empathy-based morality, and I clarify my thesis about the necessity of empathy in moral development, suggesting that the thesis should be understood as a claim about moral development in humans. In the second section, I describe Prinz's argument against the developmental necessity thesis. Prinz's discussion of moral development focuses on three issues: moral deficits in psychopaths, moral deficits in autistic people, and theories of moral development. He argues that psychopaths' and autists' impaired empathic abilities are not responsible for their impaired moral competence, and he proposes an imitation-based account of moral development to explain how the development of moral competence involves the acquisition of emotional capacities via imitative learning. I review the empirical literature concerning psychopaths and autistic people and offer an alternative explanation for psychopaths' and autists' moral deficit which favors the empathy-based account of moral development that I propose. In the third section, I defend a broader conceptualization of empathy that helps us to understand moral competence, and I distinguish two roots of empathy – perceptual empathy and imaginative empathy – based on distinct underlying mechanisms.

4.2 Is Empathy Necessary for Morality?

I start with the issue of whether empathy is necessary for morality. Prinz is not the first to challenge the view that empathy is necessary here. Jeannette Kennett in "Autism, Empathy, and

Moral Agency" (2002), Victoria McGeer in "Varieties of Moral Agency: Lessons from Autism (and Psychopathy)" (2008), Heidi Maibom in "Feeling for Others: Empathy, Sympathy, and Morality" (2009), and Peter Goldie in "Anti-empathy" (2011) have adopted this perspective as well. Many of those who argue against empathy as a precondition for morality adopt a Kantian rational account of morality. Kennett, for instance, argues that an examination of moral thinking in autistic people shows that moral agency can be developed in the absence of empathy, and that this evidence can support a Kantian account of moral agency.

Unlike these rationalist critique, a few Humean philosophers have argued against empathy. For example, Victoria McGeer (2008), which endorses a Humean view of morality, has argued that reason-based judgments play only an instrumental role in morality, that only emotions have the required motivational force that accompanies moral attitudes, and consequently that all kinds of human moral agency are rooted in affect. However, she denies that empathy and perspective-taking abilities are the basis of morality. She suggests that people with autism challenge this view. In autism, the deficit of empathy and perspective-taking abilities do not lead to a deficit in morality. She concludes that empathy should not be considered the only emotion to provide moral motivation; other kinds of affective dispositions (which are available to people with autism, such as affective concern) also play a role in morality.

Prinz's critique (2011a) also defends a sentimentalist account of morality. As a sentimentalist, Prinz shares the Humean intuition that emotions are essential for moral judgment and moral motivation and that moral judgments involve approval and disapproval. According to Prinz (2011a), Hume's sentimentalism can be formulated as a constitution claim: to believe that something is morally right or wrong consists of approving or disapproving it. Prinz endorses the Humean view of morality but dismisses empathy as the basis for moral approval or disapproval. He argues for what he calls an *antiempathic sentimentalism*.

In "Against Empathy," Prinz takes issue with the Humean thesis that empathy is a precondition for morality. He analyzes two central points of Hume's project: 1) the *definitional thesis* that empathy is feeling an emotion that we take another person to have; 2) the *precondition thesis* that empathy is a constitutive precondition for moral approbation or disapprobation. When the precondition thesis is combined with Hume's sentimentalism, it follows that empathy is a

precondition for moral judgment. Prinz endorses Hume's sentimentalism but rejects his precondition thesis.

More precisely, Prinz denies that "moral approbation involves any kind of congruence between the emotions of the one who approves and those on either side of the action being approved of" (2011a, p.218). There are many ways to connect empathy and moral judgment. However, Prinz rejects all theories that necessarily connect empathy and morality. He argues against six versions of the precondition thesis, corresponding to the following six types of precondition: 1) constitutive (empathy is a necessary element of moral judgment); 2) causal (empathy is necessary for causing moral judgment); 3) developmental (empathy is necessary for developing moral agency); 4) epistemic (empathy plays a necessary epistemic role in moral judgment); 5) normative (empathy is necessary for justifying moral judgment); and 6) motivational (empathy is necessary for moral motivation).

The general form of Prinz's arguments against these theses might be reconstructed like this:

P1. Moral judgments are constituted by sentiments of approbation and disapprobation.

P2. Empathy plays a contingent role in moral sentiments of approbation and disapprobation.

P3. If empathy plays a contingent role in moral judgment, empathy is not necessary for morality.

C1. Hence, empathy is not necessary for morality.

Premise P1 expresses Prinz's emotionism[61] and will not be the target of my discussion. Premise P2 is a modal thesis, which Prinz supports by counterexamples and psychological research. The conditional premise P3 covers all the types of necessary connection between empathy and morality denied by Prinz.

In effect, there are six different versions of the argument corresponding to the six different kinds of preconditions. As we have seen above, these six precondition theses make six different claims about a necessary role for empathy in morality. For example, the developmental

[61] Emotionism – such as defined by Prinz (2007) – is any theory that claims that emotions are essential to morality. Prinz distinguishes the term 'emotionism' – which he defines as an overarching label for any view that claims that feelings are essential to morality – from the term 'emotivism' which is a specific version of emotionism. Prinz argues for a strong form of emotionist view, defending what he calls 'constructive sentimentalism,' the view that "sentiments literally create morals, and moral systems can be created in different ways" (Prinz 2007, p. 9).

precondition thesis says that empathy is necessary for moral development. In Prinz's argument against this thesis, premise P2 says that empathy plays a contingent role in moral development, and the conclusion says that empathy is not necessary for moral development. This is the version I will focus on.

I will deny premise P2, arguing that empathy plays a necessary role in moral development in human beings. I argue that there are aspects of our morality for which empathetic emotions are necessary. Where Prinz uses empirical results to argue against the developmental precondition thesis, I suggest different interpretations of the results. Recent experimental work shows that empathy plays a key role in the emergence of moral agency in human beings. I also endorse an ontogenetic account of the development of moral agency based on empathy. I use these considerations to reject conclusion C1, which claims that empathy is not necessary for morality, at least when this claim is restricted to human beings.

The idea that empathy is not necessary for moral judgment can be understood either as a claim about all moral systems or as a claim about human beings. The former claim is that there are possible moral systems that have moral judgment without empathy. I accept that empathy is not necessary for moral judgment in this sense. We might conceive a primitive system, for instance, like a mythical savannah (Prinz 2007) populated by early humans living in a natural state governed by pre-moral values, where people do not need empathy to follow rules and respect authority. In this primitive situation, empathy might not be involved in attitudes of approval and disapproval. In a natural state, a primitive agent might use other elements to moralize. For instance, he might use reactions of disgust or anger as guides to moral action (although one question is whether this kind of behavior counts as moral thinking or as mere regulation of behavior).

For present purposes, the necessity claim should be understood as a claim about human beings. That is, because of the way human beings are psychologically constituted, empathy is necessary for human moral development. It is this claim that I will defend. It is true that even humans can morally disapprove of others without directly passing through empathy or the affective perspective-taking process. Recent psychological studies (Haidt 2012) show that moral judgment can be a result of automatic affective reactions. We can form a moral judgment on the basis of gut feelings. However, on the view I will argue for, gut feelings in humans only count as

moralizing when they express attitudes of disapproval of a moral agent, and the characteristic features of a moral agent depend on the capacity to arrive at moral attitudes as a result of a process of empathic simulation and affective perspective-taking.

4.3 Autism, Psychopathy, and Moral Development

Many contemporary works in moral psychology emphasize the constitutive role of empathy in early moral development (see Batson 1981, 1991, 2011; Eisenberg 2000; Hoffman 2000, 2011; Tomasello & Vaish 2013). The central thesis defended by many moral psychologists is that empathic processes are the psychological mechanisms underlying moral agency. Morality involves processes of behavioral regulation toward others. Quite early in ontogeny, infants start using empathic processes to regulate their behavior toward others. When a child shows no empathy to others, we can predict that she will fail both to acquire concern for others and to be able to appreciate how her actions affect others. Consequently, the lack of empathy will affect her capacity to evaluate her own actions and others' actions as being right or wrong and to react to those actions either expressing disapproval or approval. We can predict that people who display difficulties in empathic abilities are also impaired in morality.

The idea that empathy plays a central role in moral development is supported by several studies which investigate the correlation between empathy, prosocial behaviors, and cooperation (Batson 1981, 1991, 2011; Eisenberg & Strayer 1987; Eisenberg 2000; Hoffman 2000, 2011; Tomasello & Vaish 2013). Early in ontogeny, children start behaving prosocially and engaging in cooperative and altruistic actions. The question here is: what are the psychological mechanisms that enable children to behave prosocially? The studies have shown that emphatic processes provide children with the affective, cognitive, and motivational abilities to behave prosocially. Empathic processes motivate altruistic behaviors, such as helping, caring, and other-directed comforting behavior and relate negatively with antisocial and aggressive behavior (Batson 1981, 1991, 2011; Eisenberg 2000; Hoffman 2000). Empirical data show that the capacity for moral reasoning and moral agency is strongly dependent on the capacity to respond empathetically to others' affective states and to take the perspective of others into account.

Prinz challenges this interpretation and argues that there is no empirical data to provide evidence for the strong conclusion that empathy is the basis of moral development. He does not

deny the positive correlation between empathy and moral judgment, and empathy and prosocial behavior. However, he denies that this correlation is evidence for the developmental necessity thesis. Prinz (2011b) addresses three potential sources of evidence for the thesis: evidence concerning psychopaths, evidence concerning autistic people, and theories of moral development.

The two pathological populations – psychopaths and autistic people – have been of special interest in moral psychology. Both populations show deficiencies in social understanding, social responsiveness, and moral competence. Both psychopaths and autistic people also have impaired empathic abilities. A popular view is that their empathic impairments explain their moral impairments (Nichols 2004). Psychological research on these populations seems to support the view that lack of empathy affects moral competence (Blair 2005), suggesting that empathy plays a key role in moral development.

Prinz (2005, 2011a, 2011b) rejects this explanation. He argues that evidence from autistic people and psychopaths does not support the developmental precondition thesis. I will consider his arguments in both cases, focusing especially on the evidence from psychopaths.

Psychopathy. Psychopathy is a disorder associated with callous and unemotional traits (lack of fear, guilt, remorse, and shallow affect) and antisocial and aggressive behavior (Blair et al. 2005; Patrick 2005). It is widely held that psychopaths' emotional deficits explain their lack of empathy, and their impaired empathy explains the lack of moral competence. Psychopaths lack emotions that facilitate moral education and lack emotional responses that constitute moral judgments.

According to Prinz (2005), psychopaths' moral deficits can be explained without appeal to the empathy deficit. It is the lack of basic emotions, such as fear and sadness, and not the lack of empathy that explains the impairment in moral reasoning detected in people with psychopathy. The account Prinz favors is based on the dysfunctional fear hypothesis.[62] Under this hypothesis, psychopaths are impaired in the systems modulating fear behavior (Fowles 1988). Psychopaths show reduced aversive conditioning and reduced emotional responses in anticipation of

[62] Roughly, there are two cognitive models in empirical literature to explain moral deficit in psychopathy. One model is the behavioral inhibitory system put forward by Fowles (1988) and others, that claims that psychopaths have a basic deficit in their rudimentary behavior system that underlies many aspects of emotions and causes impairment in aversive behavior and fear. The other one is the early violence inhibitory model (VIM), updated to the integrated emotion systems developed by Blair (Blair et al. 2005), that explains the nature of the emotional impairment in individuals with psychopathy as a result of impairments in different systems, such as dysfunctional empathy, dysfunctional fear, and dysfunctional VIM.

punishment and in imagining threatening events. Psychopaths' fear deficit prevents them from being socialized and from developing moral competence. Moral socialization is achieved through the use of punishment. Aggressive punishment instills fear, and fear of punishment is often used during moral training. A child that is frightened by punishment will associate this fear with the action that resulted in the punishment and will develop conditioned aversive responses to anticipated threats. A child that does not display fear of punishment will not learn good conduct if threatened with punishment.

Prinz argues that psychopaths' moral impairment can be explained by a deficit in inhibitory behavior and inhibitory emotions. He claims that the same dysfunctional system that impairs fear in psychopaths may also impair sadness, other negative emotions, and negative reactions. Sadness, he claims, is crucial to morality because it is involved in recognition and response to the sadness of others, and it is a basic element that can be used to create moral emotions (such as shame and guilt).

Moral emotions are complex emotions that arise in contexts that involve conformation to or violation of a moral rule. Prinz (2005, 2007) holds the view that moral emotions (such as shame, guilt, regret and indignation) are generated by a blend of basic emotions (e.g. fear, sadness and anger), which are combined with a calibration process. In the calibration process, as proposed by Prinz, a basic emotion that initially had one set of eliciting conditions can be assigned a new set of eliciting conditions that have been elaborated through experience to form an independent elicitation mechanism. For example, Prinz claims that "guilt is just sadness that has been calibrated to situations in which one has caused harm to someone that one care's about" (Prinz 2005, p.273). That is, the emotional blend can be associated with situations where the child "catches" another's emotional states (distress, negative reaction, disapproving, etc.) by copying another's emotional states through imitation or emotional contagion.

In "Imitation and Moral Development" (2005), Prinz gives imitative learning a fundamental place in the explanation of moral development. To develop moral competence, a child must be able to react with negative emotions in the presence of caregivers' disapproval or in the presence of another's distress. To be able to react with negative feelings in those contexts requires not only the basic disposition of feelings of fear and sadness, but also the ability to "catch" others' emotions and to "catch" others' distress. Emotional dispositions are established by imitation. In

our socialization process, we mimic perceived emotions (facial expressions and vocalizations), and eventually we copy (via imitation) the inner states of others, such as shame, guilt, and others' distress. Seeing others' distress triggers vicarious distress and, further in development, it triggers consolation responses. So, Prinz concludes, psychopaths are bad moralizers because they cannot learn the appropriate emotional reaction to their conduct in the context of their victims' distress, neither through imitative learning nor through emotional contagion.

However, imitative learning cannot fully explain moral development. Imitative learning might explain recognition of basic emotions, but it cannot explain the development of moral emotions such as guilt, shame, regret, admiration and empathic concern. As I will argue later, we cannot "catch" those complex emotional reactions by "copying another's affective state" through imitative learning, even in the broad sense of imitation adopted by Prinz (2005). The intentional and motivational elements of those affective states are not available for direct perception and associative learning. A complete explanation for the development of moral emotions must involve empathy. If this is right, Prinz's hypothesis about psychopaths is at best incomplete.

This does not mean that we must abandon the dysfunctional fear hypothesis. Instead, we can use that hypothesis but add a role for empathy. It may be that impairment in fear[63] causes impairments in shared fear and in empathy, and these impairments in turn cause the moral deficit. It is clear that being able to feel emotions (such as fear, anger, sadness, joy, disgust, and surprise) is a prerequisite for sharing those emotions and for (emotional) empathy. Thus, impairment in feeling emotions (as stated in the dysfunctional fear hypothesis) will, necessarily, cause a deficit in shared emotions and in empathy. It is natural to suppose that this deficit is what leads to moral deficits in psychopaths (at least in a sentimentalist approach of morality). In effect, the hypothesis is that impaired empathy mediates the connection between impaired emotions and impaired morality. This provides an alternative to Prinz's hypothesis that impaired imitative learning mediates the connection.

It is also arguable that Prinz's hypothesis cannot work unless empathy is given a key role. It is widely believed that psychopaths' moral impairments are especially tied to impairments in recognizing and responding to their victims' distress. These impairments are naturally explained in terms of impairments in sharing victims' distress, which can be seen as a form of empathic

[63] I will not talk about feelings of sadness, as very little is known about how sadness is affected in psychopathy.

concern. Prinz's hypothesis requires that imitative learning alone can explain the recognition of others' distress. He argues that concern for the victim's distress is a metacognitive ability that emerges late in development and derives from early vicarious distress, which is a more basic ability used to catch others' distress via emotional contagion. However, in the following section, I will argue that vicarious distress requires empathic abilities. It cannot be explained simply through emotional contagion.

It is true that there is a simple form of vicarious distress by emotional contagion in infants that does not require empathic abilities. However, this sort of early vicarious distress by emotional contagion happens before the development of full self-other differentiation. In early vicarious distress, the infant is not experiencing or recognizing others' distress; the infant is experiencing her own distress, which leads to personal distress and not to empathic concern. This rudimentary phenomenon cannot explain those elements of moral development that involve the recognition of others' distress. To explain that, one needs a more complex form of vicarious distress involving empathy. On my account, early vicarious distress in emotional contagion evolves first into empathic vicarious distress, and, then, eventually, to empathic concern. Empathy helps us to get information about the manner in which an event or an action might affect a person emotionally and cause others' distress.

My explanation of the role of empathy in connecting emotions and moral development in psychopaths fits well with recent research on psychopaths by Blair and others. Psychopaths show impairment in recognition of fear expressions (face, body, and voice) (Blair 2005; Marsh, Blair 2008), reduced experience of fear (Marsh et al. 2011), impairment of response to fear in others (Marsh, Cardinale 2012), and impairment of the ability to identify behavior that causes fear and in judging the moral acceptability of those behaviors (Marsh, Cardinale 2012). Also, psychopathy affects judgments of transgressions associated with harm. Psychopaths tend to err in treating conventional violations like moral violations, and they are less likely to justify their judgments by referring to the victim's welfare (Blair 1995, 2005). Their propensity to inflict harm to others indicates a profound disturbance in their empathic response to the suffering of others (Blair 2005). The ability to recognize others' distress is crucial for the experience of empathic concern (Nichols 2001). Any impairment in the early emotional recognition ability or an innate impairment in the ability to perceive and respond to the affective expressions of others will lead to a dysfunctional emotional empathy. As Blair (2005) suggests, an individual that

shows impairment in emotional empathy is difficult to socialize through empathy induction, a practice that involves the socializer focusing the attention of the transgressor on the distress of the victim. All this is further evidence for a role of empathy in explaining psychopaths' moral impairment.

Autism. Prinz suggests that experimental work (Blair 1996, 2005) shows that autistic people, unlike psychopaths, seem to both acquire an understanding of moral rules and exhibit a deficit of empathy. He concludes that if this interpretation is correct, "acquisition of moral competence *may* not depend on a robust capacity for empathy" (Prinz 2011b, p. 222). Kennett (2002), Nichols (2004), and McGeer (2008) have also argued that in autism the deficit of empathy does not inevitably lead to a deficit in morality. People with autism show a lack of empathy, but they still have a sense of morality. According to Nichols (2004), autists' preserved ability to make moral judgment, despite their impairment in simulating another person's perspective, reveals that perspective-taking accounts of morality must be empirically wrong. From this evidence, Prinz (also McGeer and Kennett) concludes that empathy is not necessary for the development of moral agency; if empathy plays any role in moral development, it plays an instrumental role, hence, a contingent one.

One way to resist this conclusion has been to show that while people with autism are impaired in cognitive empathy and mind-reading abilities, they are able to experience emotions, display affective empathy, and emotionally respond to others' distress. This suggests that their moral competence might derive from their emotional empathic abilities (Blair 1996; Nichols 2004).

The view that autistic people show morality without empathy has also been challenged by de Vignemont and Frith in "Autism, Morality, and Empathy" (2008). They challenge both ideas: that autistic people show a lack of empathy and that they show a sense of morality. They argue that autistic people have some degree of automatic emotional empathy: they show emotional recognition and autonomic responses to others' facial expressions of sadness and fear. Experimental work (Blair 2005) yields evidence that autistic people may have emotional components of empathetic behaviors. They are capable of displaying empathy toward the distress of others. Accordingly, while autism may involve impairment of cognitive empathy (the ability to know what another person thinks), some emotional empathy remains intact. The lack of

empathetic behavior in autism has been attributed to deficits in mentalizing processes (Batson et al. 1987; Blair 2005). Despite showing preserved emotional empathy and preserved capacity of emotion recognition, studies based on parental reports suggest people with autism show specific impairments in their affective relatedness towards other people (Hobson et al. 2006). They clearly manifest signs of happiness, distress, anger, and fear as emotional responses to the moods of others, but they present limitations in experiencing and manifesting other-person-centered feelings, such as sympathy and concern; also, they rarely express feelings for and in relation to other people (Hobson et al. 2009). According to the reports, they show jealousy towards others and are affected by others' moods, but fewer show concern, guilt, or empathetic sadness. People with autism are more likely to describe situations in terms of breaking the rules rather than in terms of causing physical or emotional harm to others (Hobson et al. 2009).

De Vignemont and Frith (2008) suggest that the presence of the emotional component in people with autism may explain why they show apparently preserved moral competence. People with autism are able to detect the transgression of normative rules and to detect distress in others. Nevertheless, they do not seem capable of detecting moral violations. This detection requires correlating two facts: a moral transgression and someone's suffering without moral justification. People with autism seem to fail to correlate these two facts. De Vignemont and Frith (2008) also suggest that the problem with autistic people in detecting moral violations may be related to the way they make the distinction between allocentric and egocentric representations. People with autism display extreme egocentrism disconnected from allocentrism, meaning their social world is self-focused, they lack social intuitions and make abstract analyses of their surroundings, and "they are more interested in normative rules than in emotions due to an abstract allocentrism disconnected from egocentric interactions with others" (de Vignemont & Frith 2008, p.280). Their conclusion is that we cannot rule out the possibility that the rules followed by autistic people are merely perceived by them to be conventional rules, and that their apparent capacity for moral judgment is the result of applying those conventional rules.

Although this conclusion cannot defeat Prinz's argument that autistic people are able to make moral judgments, it can offer an alternative interpretation to this phenomenon. First, emotional empathic abilities seem to be preserved in high-functioning autistic people, and this preserved ability might explain their ability to make moral judgments, despite their limitations in experiencing and manifesting empathic concern and offer comfort in the context of other's

distress. Second, there is no strong evidence that their apparent capacity to make moral judgments is the result of applying moral rules or displaying moral concern.

Theories of Moral Development. Prinz's third argument is against developmental theories that emphasize the role of empathy in moral development. Developmental moral psychology describes how we evolve to become moral agents, how we come to distinguish between right and wrong, and how we learn the distinction between conventional and moral rules. Prinz's developmental story (2005) emphasizes the central role of imitation in learning to be emotionally responsive to moral judgments. He suggests that moral learning requires a different kind of imitation; children might "copy the inner states of others," and not just "their goal- directed behaviors." His main argument is that imitation helps us to acquire forms of moral comprehension. Our moral understanding involves a range of emotional capacities that depend on imitative learning to be acquired. Prinz describes five stages of normal moral development. In the first stage, infants experience the emotions of others via facial mimicry; moral responsiveness begins with emotional contagion in newborns. This stage contributes to the emergence of concern and empathy. In the second stage, toddlers engage in prosocial behavior and early consolation. In the third stage, children become responsive to moral rules. In the next stage, children begin to engage in reparative behavior and moral condemnation. In the last stage, children distinguish different classes of norms through the attainment of moral emotions (guilt, shame, outrage). According to Prinz (2005), imitative learning makes contributions to all those stages, and none of those forms of moral learning requires empathy. He concludes that acquisition of moral competence does not depend on a robust capacity for empathy.

There are at least two obscure points in Prinz's developmental moral story. First, he explicitly neglects well-known empathetic processes that emerge in human development and are fundamental for developing sociality and moral competence. It is widely accepted that those processes contribute to the acquisition of moral competence. As I argued in a previous work (Rochat & Passos-Ferreira 2008), imitation and mirroring processes are necessary but not sufficient conditions for children to develop morality. Imitation provides the basic sense of social connectedness, including mutual acknowledgment of existing with others that are 'like me' (Meltzoff 2007). However, for morality to develop, imitation and mirroring processes need to be supplemented by an open system of reciprocation and shared representations (of emotions and other mental states). Imitation and emotional contagion decreases as the individual develops

other cognitive capacities. Developmental research shows that from the second month, mimicry, imitative, and other contagious emotional responses are bypassed. Imitation gives way to signs of reciprocation and emotional co-regulation. As joint attention to objects develops, shared affective representations also emerge. Eventually an explicit moral sense develops, accompanying the emergence of mind-reading and imagination by age 4. Around age 5, children show explicit understanding of the mental states that drive others in their behaviors and beliefs, allowing children to understand the motivational aspects that trigger moral attitudes (Rochat & Passos-Ferreira 2008).

Second, Prinz's imitation story is only a partial story about understanding others' minds. Imitation and emotional contagion are just the foothold for understanding others as bearers of mental states. Further developments are needed for understanding other types of mental states, which are far from purposive actions, desires, visual perception, and basic emotions. For these states, there is a relatively close coupling between the underlying mental states and their expression in bodily action. We can infer those states through perception and imitation, as Prinz argued. Empathy is not the only way to understand others. However, it is psychologically our most pervasive method for identifying mental states in others. It enables us to infer other mental states in a faster and more accurate way. Empathy allows us to make faster and more accurate predictions about other people's needs, their emotions, and the intentions of their actions. In addition to this, empathy is the only reliable mechanism for understanding the mental states of people to whom we do not have direct perceptual access and whose thoughts are not overtly expressed in their actions. It is especially relevant to grasping false beliefs, divergent beliefs, divergent affective and cognitive perspectives, and secondary moral emotions.

To moralize – that is, to think morally – depends on sharing others' affective states and taking others' affective perspective into account. Sharing, simulating, and imagining others' emotional states is necessary for developing secondary emotions, such as feelings of empathetic concern, shame, guilt, regret, resentment, outrage, and admiration. I argue that a basic empathetic mechanism is necessary to acquire secondary moral emotions. The mere capacities to imitate basic emotions (fear, anger, disgust, happiness, or sadness) or to copy the inner states of others are not enough for understanding and internalization of secondary emotions, which are fundamental components of our moral competence. For developing moral agency, we need a complex emotional regulatory system which is more sophisticated than mere imitation and

emotional contagion processes. The empathic systems play this role (Rochat & Passos-Ferreira 2008). In the next section, I will suggest another developmental story that leads from imitation to perceptual and imaginative empathy.

4.4 Varieties of Empathy

Empathy has been defined in a number of ways (Eisenberg & Strayer 1987; Eisenberg 2000; Batson 1998, 2011; Hoffman 2000; de Vignemont & Singer 2006; Decety & Jackson 2006). The term 'empathy' ("feeling as the other feels") and the associated term 'sympathy' ("feeling concern for the other") have been used to refer to a wide family of psychological processes. To define empathy, it is important to distinguish it from a variety of other phenomena, such as emotional contagion, sympathy, mental projection, and empathic concern. Emotional contagion is a phenomenon whereby an emotion is automatically spread from one individual to another, and it is characterized by self-other non-differentiation (e.g., a baby that begins yawning when she sees another baby yawning). In contrast, empathy implies self-other differentiation. Mental projection is a mental process in which we put ourselves in the other's position in order to understand them through simulation (Goldman 2006; Decety 2004), mind-reading (Gopnik & Meltzoff 1997), or perspective-taking. Sympathy is characterized by participating in an emotion experienced by another. It involves feeling concern, sharing suffering with others, and seeking their well-being. Empathic concern, as defined by Batson (2011, p.11), is "*an other-oriented emotion elicited by and congruent with the perceived welfare of someone in need*;" it includes empathic emotions, such as feelings of sympathy, compassion, sadness, distress, and concern.

I will adopt here Nancy Eisenberg's widely accepted conceptualization of empathy. According to Eisenberg and Strayer (1987), empathy involves sharing the perceived emotion of another; it is a vicarious affective reaction that "may occur as a response to overt perceptible cues indicative of another's affective state (e.g., a person's facial expression) or as the consequence of inferring another's state on the basis of indirect cues (e.g., the nature of the other's situation)." (1987, p.5)

Traditionally, psychologists distinguish between two psychological processes involved in empathy: *emotional empathy* (vicarious sharing of emotion) and *cognitive empathy* (mental perspective taking) (Smith 2006; Davis 1983; Hoffman 1977). Cognitive empathy involves

cognitive perspective taking of the thoughts and beliefs of others. Emotional empathy involves sharing affective states with another person. The different ways of conceptualizing empathy focus on one or another of those two components. Some researchers focus on the emotional aspects of empathy, while others focus on the intellectual process of inferring others' mental states. Psychologists and philosophers distinguish those processes using narrow and broad definitions of empathy. The narrow definition tries to capture empathy in its most basic form, identifying it with emotional contagion, as an automatic process of affective resonance. The broad definition describes empathy as a multidimensional phenomenon which combines both processes (affective and cognitive) involved – or a set of processes as proposed by Davis (1983) – as they emerged in early development.[64]

Prinz defines empathy narrowly.[65] He defines empathy as a vicarious emotion that involves "feeling what one takes another person to be feeling" (Prinz 2011b, p. 215). According to his account, empathy is "a matter of feeling an emotion that we take another person to have" as a response to an automatic contagion or the result of an exercise of the imagination (Prinz 2011b, p. 215). In his sentimentalist account, Prinz emphasizes the perceptual and emotional aspects of empathy and downplays the rationalist and intellectualist notions of empathy that emphasize the role of imagination, simulation, and mind-reading. However, Prinz affirms that empathy is not always an automatic process in the way that emotional contagion is; "sometimes imagination is required, and sometimes we experience emotions that we think someone *would* be experiencing, even if we have not seen direct evidence that the emotion is, in fact, being experienced" (Prinz 2011a, p. 212). Nevertheless, Prinz claims that imagination is "overly intellectual" and "a mental act that requires effort on the part of the imaginer" (Prinz 2011a, p. 212).

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[64] The multidimensional approach of empathy has been suggested by different studies. Hogan (1969) and Davis (1983) have suggested a scale of empathy (either cognitive or emotional) in which empathy is considered as a set of constructs that all concern responsivity and sensitivity to others. To some psychologists, empathy is a unitary process that includes a class of phenomena – such as emotional contagion, sympathy, personal distress, and cognitive perspective-taking – that share the same mechanism. Hoffman (1977, 2000) suggests a unitary account where the ontogenetic development of empathy starts from birth with global empathy (emotional contagion) leading to the emergence of egocentric empathic distress by 14 months, and the emergence of veridical empathy in the second half of the second year when children fully differentiate between self and other. Conversely, Blair (2005) claims that the term "empathy" subsumes a variety of different and dissociable neurocognitive processes, varying from emotional empathy and perceptual empathy to cognitive empathy.

[65] De Vignemont and Singer (2006) also suggest narrowing down the concept of empathy. However, they argue for the exclusion of the automatic component as part of its definition. They define empathy as a conscious affective state, isomorphic to another person's state, that is elicited by observation or imagination of another person's affective state.

As Prinz notes, his definition of 'empathy' is similar to the definition of 'sympathy' used in the tradition of moral philosophy, including David Hume and Adam Smith. However, emotional empathy alone may not play the crucial role required for a sentimentalist account of morality. Even for sentimentalists like Hume and Smith, moral approval and disapproval involve impartially placing oneself in the perspective of the person affected and sharing their emotions and reactions. To understand the role (if any) that empathy plays in morality – at least according to sentimentalists – we should adopt a broader conception of empathy that includes both emotional empathy (sharing of emotions) and cognitive empathy (affective perspective-taking).

The broad definition (including both cognitive and affective empathy) specifies the content of empathy as a reaction to the observed experiences of another that is shared (sharing cognitive states and sharing emotional states). However, the distinction between cognitive empathy and emotional empathy does not capture all the processes involved in sharing emotions. I suggest an additional distinction that focuses not on the empathic reactions (cognitive or affective), but on the underlying psychological mechanisms necessary to access others' affective states. I will distinguish empathy as a response to a direct perception of others' emotions – which I call *perceptual empathy* – and empathy as a response to imaginative or projective simulation of others' affective perspective – which I call *imaginative empathy*. These mechanisms help explain how emotional empathy develops into a more sophisticated emotional state that allows us to directly perceive or imagine or simulate others' emotional states. These two processes are part of a continuum of empathetic processes that emerge in early human development of the ability to understand and identify another's emotional state. As cognitive abilities develop, there is an ontogenetic chain of processes leading from mimicry and emotional contagion to empathy, sympathy, compassion, and perspective-taking. This distinction helps us to understand the developmental basis of the connection between empathy and morality.

In early development, we distinguish different levels of empathy. This process starts from birth via neonatal imitation and emotional contagion, and leads to the capacity to mimic and resonate with other's emotional states. Later, an understanding of others' emotional states and intentions develops, along with affective perspective taking via joint attention, simulation and imagination. The ability to understand and respond to another's emotional state appears in the very beginning of an infant's development and increases to complex levels of empathy over time.

Elisabeth Pacherie (2004) suggests three degrees of empathy and of their respective psychological mechanisms, on a continuum going from imitation and emotion contagion to perceptual and imaginative empathic processes, covering different stages of child development. In each stage of ontogeny, children develop empathic abilities corresponding to the understanding of three aspects of others' mental states: 1) the type of emotion experienced by others, 2) the situation that is causing the specific emotion experienced by others, and 3) the motivational factors triggered by the emotion. The three degrees of empathy are the ability to identify an emotion, the ability to understand the intentional object of the emotion, and the ability to understand the connection between the type of emotion, its intentional object, and the motivational factors triggered by the emotion. In this respect, my developmental proposal can be seen as an elaboration of Pacherie's account.

The first level is emotion recognition, which is the ability to *identify the type of emotion* experienced by others. How does our capacity to use perceptual clues to understand the emotion experienced by others emerge? This level starts with early imitation of facial and vocal expressions in newborns. According to Meltzoff (1977), newborns can equate their own unseen behaviors with gestures and facial expressions they see others perform. Facial imitation suggests an innate mapping between observation of another's expression and execution of a motor action. In imitation, there is an automatic correspondence between the visual information of the observed facial expression and the proprioceptive information of the motor representation. When a baby imitates a facial expression, her imitation is based on a motor representation formed when she is observing another's expression. In early imitation, there is a correspondence between observing an expression, adopting a facial expression or a body posture, and feeling the corresponding emotion (Meltzoff 1977). Newborns' facial mimicry leads to emotional contagion through facial and vocal feedback. By two months, infants engage in face-to-face proto-conversations, reciprocating with others in what amounts to a process of emotional co-regulation and affective attunement (Rochat & Passos-Ferreira 2008). Imitation and emotional contagion are based on two distinct processes: a direct connection between perception and action and a direct connection between proprioceptive perception and facial expression (Pacherie 2004). Early imitation and emotional contagion always involve proprioception – an awareness of our body's movements and positions – but do not involve an explicit self-other distinction.

Unlike imitation and emotion contagion, empathy emerges when an infant becomes aware of self-other distinction. In early development, specific cognitive functions emerge that allow infants to distinguish emotional contagion – which involves no awareness of self-other distinction – and empathy – which involves awareness of self-other distinction. As Pacherie (2004) points out, the first level of empathy involves the emergence of a direct connection between the evoked motor representation and the emotional experience *without having to necessarily go through the proprioceptive stage*, i.e., without the corresponding imitation of others' expression. In the early form of perceptual empathy, infants have perceptual access to another's emotional state through facial gestures and vocal expressions without necessarily forming a motor representation through proprioception. This allows infants to distinguish between feeling their own emotions, observing the same emotions in others, and sharing others' affective states.

The second level of empathy is the ability to *understand the object of the emotion*. At this level, the subject identifies the relationship connecting another's emotion with a given situation. This ability emerges with the development of joint attention processes, social references, and intentional communication. With the emergence of the drive to co-experience events and objects in the environment with others, by nine months, babies start learning and developing shared meanings about events and objects and understanding the intentions of others' behaviors. The meaning of a perceived event (e.g., whether something is dangerous or threatening or disapproved) is now referred to through others' emotional responses; to some extent, it is evaluated in relation to others (Rochat & Passos-Ferreira 2008). This cognitive capacity allows the subject to understand others' affective states. In joint attention and social reference processes, when a child observes an object or an event that is the focus of her mother's attention, the child treats the mother's emotions and her facial and vocal expression as a commentary on the object or event. We interpret another's emotions as a commentary and an appraisal of situations and events, which gives us information about the environment. Such processes allow the child to understand the causal role of emotions and understand the motivations of others' affective reactions. As Pacherie (2004) points out, in becoming referential, toddlers develop access to agents' motivations and develop the ability to identify the immediate intentions of the agent by observing the way she behaves. Our intentions are reflected in our body movements, and the mere observation of an action performed by others allows us to detect others' intentions and motivational states.

In the first two levels of empathy, there is a direct connection between perception and action, which allows the subject to identify the type of the emotion and to understand the intentional object associated to the observed emotion (Pacherie 2004). This form of empathy as *direct perception* I call *perceptual empathy*. Perceptual empathy plays a crucial role in situations where the subject has perceptive cues that allow direct access to the type of emotion and its intentional object through perceptual mechanisms. It allows the subject to understand others' mental states, such as goals, attitudes, motivations, and affective states, and to identify the situation that is causing others' emotions.

The third level of empathy involves the ability *to understand the correlation between the type of emotion, its intentional object, and its motivational factors*. This form of empathy relies on simulation and imaginative capacities. By the age of two, children start engaging in elaborate games of imagination and symbolic pretense in which objects and actions in the actual world are taken to stand for objects and actions in a realm of make-believe. They start imagining hypothetic situations and creating imaginative characters. This capacity increases once additional cognitive abilities emerge during child development. Children progressively acquire imaginative flexibility and the ability to simulate others' cognitive and affective perspective. This more elaborate form of empathy – which I call *imaginative empathy* – is necessary when the situation provides the observer with no transparent or direct access to others' mental states. In opaque contexts, emotions are not overtly expressed, and the motivational aspects may differ from our own motivations in similar contexts. In the early stages of empathy, imitation and emotional contagion processes involve mainly basic emotions (e.g., happiness, fear, sadness, anger, surprise, and disgust), which are characterized by universal facial expressions that the subject can have direct perception and transparent access. In imaginative empathy, imagination and mental simulation are fundamental mechanisms that allow the subject to understand secondary emotions (social and moral) and to infer their motivational potential. According to Pacherie (2004), in *transparent contexts*, both forms of perceptual empathy – identification of the type of emotion and understanding the connection between emotion and its intentional object – can emerge from perceptual mechanisms that establish a direct connection between perception and action. In transparent contexts, we can overtly perceive cues that indicate another's affective state (e.g., a person's facial expressions or body gestures). However, in *opaque contexts*, in the absence of

perceptible clues, we must rely on imaginative empathy to grasp the ternary connection between the type of emotion, its intentional object, and the motivational factors triggered by the emotion.

Throughout most of our lives, we are involved in opaque contexts where we need imaginative empathy and mental simulation to understand and infer others' emotional states. Empathy, defined as this capacity to understand via perception or imagination the type of emotion and the connection between emotion, motivational aspect, and intentional object, is essential for moral development. The capacity to express moral attitudes involves the capacity to understand and identify secondary emotional reactions like guilt, shame, contempt, regret, admiration, outrage, and concern. Imaginative empathy plays a central role in understanding those affective reactions and allows us to internalize those emotional reactions as we imagine or simulate them based on others. We can experience, for example, feelings of shame, guilt, regret, admiration, or outrage in certain circumstances, because we can place ourselves in the shoes of those primarily affected by the action and share their reactive attitudes. This is the way children come to understand and internalize moral rules and moral attitudes.

According to this conception, empathy involves mental simulation and imagination of others' feelings, imagination of how others perceive our actions, and imagination of whether or not they approve of us. The internalization of imagined feelings and the simulation of others' affective perspective is crucial for the development of a moral agent capable of following moral rules and behaving morally. The characteristic features of a moral agent depend on being able to arrive at moral attitudes as a result of a process of empathic simulation and affective perspective-taking. As I have argued, imitation and emotional contagion are only the first step of this process. The emergence of perceptual and imaginative empathy is required to develop the capacity to think morally.

4.5 Empathy and Self-Consciousness

It has been often argued that self-consciousness plays an important role in morality (Gallagher 2007; Frankfurt 1971; Dennett 1976; Baker 1998). In an influential essay, Dennett (1976) suggested that the capacity for self-consciousness – understood as a higher-order reflective process – is essential for moral personhood. Moral personhood involves the ability of taking responsibility of his or her actions. The main idea is that self-consciousness is required for being

the agent of our own actions and being morally responsible for our actions. This research has investigated the role of self-consciousness in moral responsibility, but there has been less focus on the connection between self-consciousness in moral emotions and moral reasoning.

Recently, Peacocke (2014) has distinguished three varieties of self-consciousness – perspectival, reflective and interpersonal. Perspectival self-consciousness involves the ability to think of oneself in a third person way, as in the case of self-recognition in a mirror; it is "the ability of to come to know contents of the form *I'm F* where the concept F is not fundamentally anchored in the subject" (Peacocke 2016, p.310). Reflective self-consciousness is "*de se* awareness of being in a *de se* state or of enjoying a state with de se content." (Peacocke 2016, p.310). Peacocke defines interpersonal self-consciousness as a particular form of awareness in which one is aware of oneself in another person's consciousness. Interpersonal self-consciousness is a form of intersubjectivity and it features in joint attention and ordinary reciprocation with others. Roughly, the concept of intersubjectivity captures the way a person understands and relates to other people. There is deep a connection between interpersonal self-consciousness (the way the subject represents himself or herself) and consciousness of others (the way the subject represents others' minds).

Peacocke claims that interpersonal self-consciousness plays a crucial role in a relationship of mutual concern. In previous sections of this chapter, I have argued that empathy plays a crucial role in moral development. On my view, these claims are deeply connected, because there is a fundamental connection between empathy and self-consciousness. Especially, the capacity for empathy and empathic concern are deeply connected to the capacity for self-consciousness, including the capacity to entertain first-person (nonconceptual and/ or conceptual) thoughts and the capacity for interpersonal self-consciousness in the sense defined by Peacocke (2014, 2016). I cannot argue for this thesis here but I hope to develop it in future work.

5

Conclusion

The topic of infant consciousness is a fascinating field. It is not only of interest in its own right, but also promises to arouse further investigation in the nature of consciousness and self-consciousness, animal consciousness, and correlated themes, such as phenomenology, perception, agency, intersubjectivity, morality.

We have seen that the case of infant consciousness raises epistemological and methodological issues analogous to the case of animal consciousness (Introduction and Chapter 1). The problems of determining whether infants are conscious and what their experiences are like lead us to a dilemma: we cannot use first-person methods to investigate consciousness in infants, but third-person methods alone seem insufficient to determine whether infants are conscious. These problems can lead to skeptical attitudes toward infant consciousness.

I have argued that we can resist the skeptical conclusion that we cannot know about infants' experiences (Chapter 1). As in the case of animal consciousness, we can use empirical methods and theories of consciousness to help us to understand the nature of infant's phenomenal experience and to analyze how behavior, phenomenal consciousness and brain reaction are correlated in the case of newborns. The best strategy is the inference to the best explanation. First, we can rely on behavioral and neurobiological signs of consciousness. These signs are based on correlations in the ordinary adult human case, and can then be applied to infants. Second, we can rely on theories of consciousness. Using this methodology, I have argued that infants are conscious at birth. In the case of behavioral and neurobiological signs, at least some of infants' mental states, such as pain, meet the conditions for consciousness, i.e., the presence of flexible behavior as proposed by Tye (2016). In the case of theories of consciousness, my conclusion is that most of the theories give explanations of consciousness which are compatible with the claim that infants are conscious, and even positively indicate that infants are conscious. I have also argued that theories of consciousness that deny infant consciousness based on the absence of a higher-order cognitive capacity are imposing an implausibly strong condition for consciousness.

Given that infants are conscious, I have analyzed three aspects of the structure of infant consciousness: the representational character of their perceptual experiences (Chapter 2); the self-representational feature of their consciousness, such as the case of the sense of agency (Chapter 3); and the emergence of moral emotions and moral agency (Chapter 4).

The first aspect analyzed was the representational structure of infant consciousness (Chapter 2). I have claimed that infants' perceptual states represent the world. I presented empirical evidence from infant studies that suggests that infants' conscious experiences do represent their environment since early stages. Since infants represent the world, the question is whether their perceptual representations are conscious. I have argued that infant's perceptual representations are conscious and their representations satisfy the conditions for consciousness for representationalist theories of consciousness, such as the PANIC theory proposed by Michael Tye. However, the case of infants' conscious representations has some implications to some externalist versions of representationalist theories of consciousness, such as causal representationalism. I have used newborns' experience of colors to argue against causal representationalism, which claims that a mental state represents a property if and only if that the mental state has been previously causally connected with that property p. My conclusion is that representationalists should be internalist representationalists or teleological representationalists, but not causal representationalists.

The second aspect analyzed was the self-representational element of infant consciousness (Chapter 3). We have also seen that young babies have agency experiences, and they represent themselves in actions as an agent. I have presented empirical data suggesting newborns have experience of agency and that they have these experiences before they develop the ability to entertain first-person conceptual thoughts. Recent data concerning agency in newborns suggest that agency experience is present at birth, but there is no evidence for first-person conceptual thought at birth. I have argued that this evidence supports the claim that newborns' agency experience occurs independently of the capacity for first-person conceptual thoughts. I have used this developmental data to reject the view that agency experience requires conceptual self-consciousness, as high-level accounts of agency claim.

The last feature investigated was the role of empathy in moral consciousness (Chapter 4). We have seen that empathy is a crucial element in morality. I have argued against Prinz's

developmental thesis, which says that empathy is not necessary for moral development. To think morally, we need to transcend our egocentric affective perspective in order to correct the limitations and distortions of this perspective. We can do this by sharing affective states and imagining the reactions of those affected by our actions. In this way, empathy serves as a positive guide in moral judgment. I have also briefly explored the role of empathy and self-consciousness in the development of moral emotions and moral agency.

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