Perception AND Action

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Abstract

This thesis is an exploration and analysis of Alva Noë and J. Kevin O'Regan's "enactive" approach to perception. In this thesis I examine the enactive approach, evaluate what the enactive approach to perception entails, and assess what needs to be further refined in order to provide a satisfactory account of perceptual experience.

The enactive account of perceptual experience aims to be both an explanation of the way that we come to have perceptual experiences and an explanation of the phenomenology of our perceptual experiences. It is a response to recent discoveries in the cognitive sciences that demonstrate the limits and fallibility of our perceptual experiences as well as a challenge to "dualist" and "representationalist" accounts of perceptual experience.

The enactive account of perceptual experience argues that perceptual experience is constituted by the perceiver's mastery of the laws of movement-related sensorimotor contingencies, rather than by the perceiver's purported ability to translate sensory data into a representation of the world.

The enactive approach of Noë and O'Regan has, and continues to be; debated, critiqued; and occasionally amended. Criticism has focused on the difficulty in clearly determining what the nature of perceptual experience is according to the enactive thesis as well as problems associated with understanding perceptual experience as a form of sensorimotor knowledge.

Firstly I will discuss in detail the main features of the enactive approach and define the key aspects, including; the aims of the enactive approach in general,

support for the enactive approach, and consequences of accepting such an account. I will also introduce some of the controversial aspects of the enactive approach that I will address throughout the thesis, in particular, the nature of perceptual content and what the enactive accounts' opposition to representational theories of perception amounts to.

One of the difficulties in evaluating the enactive approach is that the authors take various positions on the nature of perceptual content and the role that the brain plays in generating such perceptual content. As a response to problems such as the "explanatory gap" as well as research into the capacity of our brain and nervous system the enactive approach can be understood as an argument for quite limited perceptual content. On the other hand, as an account that emphasises the embodied, embedded and extended nature of perceptual experience it also can be understood as an explanation of the way that we come to have perceptual experiences that seem to be rich or detailed in nature. In the second chapter of this thesis I analyse these issues and demonstrate the necessity of modifying certain claims of the enactive approach. I also argue that in order to form a coherent account of perceptual experience the enactive account must carefully distinguish between different types of content, and, that it must also explain the constitutive role that the brain plays in perception.

One of the claims of Noë and O'Regan is that their approach is relevant across all perceptual modalities. However they do not discuss in detail how it applies to modalities other than vision and touch. In the third chapter of this thesis I explore whether or not this claim holds water. Focussing primarily on olfaction and gustation, I evaluate recent empirical research and theories to ascertain whether or not it makes any sense at all to apply the enactive approach to certain modalities, that is, whether or not the enactive account fits with the empirical evidence. As I demonstrate the evidence does provide some support for the enactive approach as well as raise challenges to it. I argue that the result of these challenges is that the enactive

approach, if it is to apply to all perceptual modalities, must be refined in certain ways, and, that the empirical evidence from other sensory modalities can be used to explain the role that the brain plays in perceptual experience.

Noë and O'Regan acknowledge that the brain plays a role in perceptual experience. They also refer to the content of perceptual experience as "virtual content." In the final chapter of this thesis I discuss Bergson's sensorimotor account of perceptual experience. Bergson draws a distinction between "virtual images" and "virtual memory". I argue that applying these distinctions within the enactive framework can provide a useful way of distinguishing between, and accounting for, different types of perceptual experience as well as an explanation of the constitutive role that the brain plays in perceptual experience. A consequence of this is that the enactive account of experience must accept that a form of brain/nerve state, a "representation", does play a role in perceptual experience. I also argue that understanding perceptual experience as representational in the way I propose is supported by the empirical evidence; and that accepting this proposal improves the overall explanatory power of the enactive thesis.

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Certification of Authorship/Originality

I certify that the work in this thesis entitled ***Action AND Perception*** has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree to any other university or institution other than Macquarie University.

I also certify that the thesis is an original piece of research and it has been written by me. Any help and assistance that I have received in my research work and the preparation of the thesis itself have been appropriately acknowledged.

In addition, I certify that all information sources and literature used are indicated in the thesis.

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Introduction

The “Enactive” account of perceptual experience – also known as the “Sensorimotor Contingency Theory” – has emerged as a challenging, if somewhat controversial, account of perceptual experience. It is both grounded in and inspired by accounts of the mind and perception that take the proper subject of the mental states in question – *perceptual states* – to be an embodied, environmentally situated creature that is coupled to that environment in a dynamic sensorimotor relationship. As such it generates and draws upon research from the various disciplines that make up the field of “cognitive science” as well as ideas and approaches from the phenomenological tradition. In line with these accounts of perceptual experience it is an account that completely rejects the argument that perception consists of the generation and use of mental “representations” as a constitutive aspect of perceptual experience.

The core idea of the enactive approach is that perception is a form of activity. It is an action, it is something we do. We *look* over there and *see* this or that; we *touch* and *smell* and *taste* and *hear*. Rather than a process that occurs within us, or perhaps to us, perception is a form of skilful activity that is learnt and developed. According to the enactive thesis perception consists of a set of bodily skills – sensorimotor skills – rather than a set of data processing units within the skin.

The enactive approach to perception to perception was first fully presented by Alva Noë and J. Kevin O’Regan in 2001 in “A sensorimotor approach to understanding vision and visual consciousness”[1] and as been developed by them and their collaborators in the years since. Their aim for the enactive approach is to

[1] J. O'Regan and Alva Noë, "A Sensorimotor Account of Vision and Visual Consciousness," *Behavioral and Brain Sciences Vol 24(5) Oct 2001, 939-1031* (2001).

provide an explanatorily adequate and phenomenologically apt description of perceptual experience. At face value their enactive account of perception goes a long way towards fulfilling these aims. However, there are certain aspects of their account that requires one to share their intuitions and reading of the data/case studies etc. in order to accept the validity of the overall approach. At times their account assumes too much to be accepted universally without further evidence to support their claims, or makes certain claims that are debatable, without properly addressing all the relevant issues. At times certain aspects of their account seem to clash or to be too extreme, Noë himself conceding: "we purchased noncircularity and explanatory power at the expense of phenomenological aptness."[2]

Personally, I am sympathetic to the enactive approach and upon first encountering it in Noë's *Action in Perception* felt that it was definitely on the right track. However upon reflection a number of questions came to mind, and, while reading the comments of others found that I was not alone in feeling that although it was on the right track, there was still much work to.

The first half of this thesis is my understanding and explanation of the unique features of the enactive approach. Essentially this constitutes my understanding or reading of the enactive thesis and may be assumed to be the version or understanding of the approach that I have in mind as I refer to it throughout, unless otherwise stated. This detailed explanation of the overall approach is intended to provide the reader with enough knowledge of the theory in order to follow my critique thereof. (Obviously, familiarity with their work – and related work – would be ideal, but for readers unfamiliar with their work who would like a brief summary of the theory in their words I would recommend their article "What it is like to see: A sensorimotor theory of perceptual experience.[3]) The other purpose of exploring the details of their account is that it is on the basis of my understanding of the enactive approach that I

[2] Alva Noë, *Action in Perception* (Cambridge MA: MIT Press, 2004) p. 228.
[3] Alva Noë and J. Kevin O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," *Synthese: An International Journal for Epistemology, Methodology and Philosophy of Science 129(1): 79-103, 2001* (2001).

develop my critique of it, with the aim of providing solutions or suggestions to improve it (that are within the spirit of the overall approach) in the later parts of this thesis. In Chapter 1 of this thesis I explain the enactive approach and I introduce some of the issues and problems with their account, as well as discussing some of the broader issues and situating the enactive account amongst its' peers.

One of the most difficult questions that all accounts of perception must deal with is the nature of the (phenomenological) content of the perceptual experience itself. Any theory of perception runs the risk of falling in a heap if it cannot provide a clear account of the nature of perceptual content. Noë and O'Regan make this task all the more difficult for themselves (and their audience) by making contradictory claims in regards to the content of experience as I show in Chapter 2. They seem to be, at best, conflicted as to how much detail is available in perceptual experience and the general phenomenology of experience itself. When pressed by commentators they unfortunately respond largely by presenting the same arguments with new terminology. In Chapter 2 I argue for a consensus on what the enactive approach ought to take as its position with regards to the nature of perceptual content. However the most reasonable solution suggests that certain distinctions must be made clear and that the role of a storage mechanism must be explained, which requires that certain amendments must be made to some of the claims of the enactive approach.

Personally, I find it frustrating that most accounts of perceptual experience tend to focus on only one or two perceptual modalities – particularly vision and touch – when a few moments of reflection on how such accounts might apply to certain other modalities raises many unanswered questions. Initially, I set out to test the claim of Noë and O'Regan that theirs is a universal account of perception, to see if there was evidence from the sciences to support it, because intuitively I had some doubts. It was then that I discovered how naïve my intuitions had been. The difficulty in applying the enactive theory to these senses was, I thought, that taste, for

example, functioned as more or less as an input-output mechanism as "*tastes*" came in contact with the tongue. Like most people I had the familiar "taste-map" conception of taste in mind, with areas on the tongue for bitter and salty and so on. Although there is still a lot of cognitive research being carried out that uses such out-dated models of the mind and perception (that support such simple models of perception) members of the scientific community are coming around to developing a more dynamic-style understanding of perception, which quickly shows many of our intuitions about the different modalities to be way off the mark. Another complexity to understanding perception is that certain modalities, such as taste and smell, can easily be shown to be systems that are connected in some way. That is, there are inter-/intra-modal perceptual experiences.

Given the lack of understanding that surrounds these issues I decided that I ought to do something about the situation. The difficulty is that, in order to do justice to the enactive approach I firstly had to find Neuro-scientific research that approaches these modalities from a dynamic perspective, of which there is not a lot as such research is relevantly new as well as sparse. The more developed *dynamic* accounts of perceptual modalities (other than vision and touch) that are available focus on taste and smell. I therefore have focused on these two senses, with supporting evidence from other modalities where applicable in Chapter 3. This is followed by a discussion on inter-/intra-modal perceptual experiences. I argue that the experimental data provided by scientific research as well as Noë and Hurley's proposed explanation of inter-/intra-modal perceptual experience (or Neuro-plasticity) both supports the conclusion that I had reached in chapter 2, that there is a role for a storage system in perceptual experience, as well as provide support for the explanation of how such a system could function that is to come in Chapter 4.

One of the most appealing and challenging aspects of the enactive approach is that it attempts to explain perceptual experience without resorting to representations. It is a "direct realist" account of perceptual experience that argues

for direct perceptual access to perceptual information from the world. The enactive approach describes the content of perception as “virtual content.” The conception of perceptual content as “virtual content” is Noë and O’Regan’s attempt to explain the seemingly rich nature of perceptual experience without the use of mental representations. However the way that the enactive approach describes and explains the nature and role of virtual content is confusing and raises many unanswered questions. As I argue throughout, the concept of virtual content as used by Noë and O’Regan is underdetermined.

In Chapter 4 I show that if distinctions between different types of perceptual experience are made, and if certain aspects of the enactive approach are more clearly defined, then it is possible to provide an explanation of the role of a storage mechanism of some kind. Henri Bergson proposed a sensorimotor-based account of perceptual experience over a century ago. In his account he also uses the conception of virtual content, in much the same way as Noë and O’Regan, however his account situates virtual content within an overall mental framework that also includes the concepts of “virtual memory” and “virtual action.” Bergson’s sensorimotor account of perceptual experience is highly compatible with that of Noë and O’Regan and so, I argue that introducing these distinctions to the enactive approach allows the enactive approach to clearly determine not only what is meant by the notion of virtual content, but also to clearly determine, distinguish and describe the way in which we come to have *different sorts* of perceptual experiences. I argue that incorporating aspects of Bergson’s account with the enactive approach can provide an overall more satisfying account of perceptual experience which gives it greater explanatory power as well as providing a more phenomenologically apt description of perceptual experience than the enactive account of Noë and O’Regan

1 The Enactive Account of Perception: A Skill-Based Sensorimotor Understanding of Perceptual Activity

> In the act of perception there are accordingly these two things, the mind engaged in a certain act, and the thing called the tree, which is not mental.
>
> - Samuel Alexander

1.1 The Aims of the Enactive Approach to Understanding Perception

The enactive approach to understanding perception is an attempt to understand perceptual experience. This approach to understanding perception has been largely developed, discussed and promoted by Alva Noë and J. Kevin O'Regan (as well as in collaboration with others), who have produced several books and papers that explain and defend this approach. Towards the end of his book, *Action in Perception*, Noë states the aims of the enactive approach:

> The enactive approach operates at two distinct levels. On the one hand, the approach, as I have developed it throughout this book, is meant to offer an explanation of why perceptual experience is the way it is. As we have seen, similarities and differences among sensory modalities, and differences in perceptual content within a modality, are explained in terms of different kinds of sensorimotor skills perceivers draw on in their exploratory activity… The theory aims, in this sense, to offer an *explanation*, of perceptual consciousness, to be explanatorily adequate.
>
> On the other hand, the theory is meant to be phenomenologically apt. It seeks to do justice to our phenomenology. For example, it proposes to explain perceptual phenomena – such as the visual experience of shape,

the experience of detail, colour experience – in a manner that is intuitively plausible and satisfying.[4]

In evaluating the enactive approach it is important to bear these aims in mind and to consider whether or not it does in fact provide an explanation of perceptual experience that is a significant improvement on other approaches, and, whether or not this explanation is one that fits intuitively with the phenomenology of our perceptual experiences. In evaluating the enactive approach its success or failure will depend upon whether or not it does in fact describe *what it is like* to have perceptual experiences and whether or not this description is explained by the enactive approach to understanding perceptual experience.

1.2 The Emergence of the Enactive Approach

The enactive approach to understanding perception is an extension and development of several approaches to understanding perception and a rejection of others.

The dominant strain of thought in this approach is the line of thought that emphasises strong interconnectedness of perception and action. This approach places emphasis on the embodiment of perceptual experience. This aspect of the enactive approach is influenced by the work of certain philosophers such as Merleau-Ponty, Husserl, Berkeley and others. From these influences also comes the idea that vision is more like touch than is perhaps otherwise thought. Another source of support for the connection between perception and action comes from empirical, comparative and evolutionary work on perception that strongly suggests that at least some sensory modalities, e.g. vision, evolved as part of the mechanisms of motor control as is the case in simple organisms.[5] However, the enactive approach differs from many of these accounts of perception. The enactive approach makes the claim that perception is itself

[4] Noë, *Action in Perception* pp. 225-26.
[5] Noë, *Action in Perception* p. 18.

a kind of action or skilful activity rather than as something that exists "*for* the guidance of action."[6] This is a fundamental claim of the enactive approach and also a source of contention. Research in cognitive science, neurology and psychology has also lead to the idea that there is two functionally different visual systems; one for the visual guidance of action and one for other cognitive activities. The enactive approach, Noë argues, can accept that some visual content is for action and that some is not, but makes the claim that both forms of perception are a skill or skilful activity.[7]

Another approach to understanding perception that has influenced the enactive approach is that of Gibson. Gibson describes his view as an 'ecological' approach to understanding perception. According to Gibson there is a *perceptual attunement* between animals and the world, and, as a result of this animals are sensitive to the features of their environment that allow possibilities for action (which Gibson refers to as "affordances").[8]

1.3 The Scope of the Enactive Theory of Perception

In evaluating the enactive theory of perception I will be evaluating what the proper scope of the theory should be. That is to say, what the theory describes and explains and what it leaves out. Here I shall outline the scope of the enactive thesis and later, having examined the thesis in detail, I shall examine whether or not the enactive thesis accurately describes and explains everything within this scope.

For the most part Noë and O'Regan present the enactive approach as an all-encompassing project that can explain all perceptual activity. This attitude is shown by the way that Noë and O'Regan see the enactive approach as an unproblematic way to explain the workings of any perceptual/sensory system from prosthetic perceptual apparatus to self-guided missiles. However the enactive approach is actually constrained by what actually constitutes perceptual experience by its own definitions. A

[6] Noë, *Action in Perception* p. 18.
[7] Noë, *Action in Perception* p.19.
[8] Noë, *Action in Perception* pp. 20-21.

major limitation on the enactive approach is that it can only describe and explain the perceptual experience of perceivers that have certain kinds of bodily skills and capable of self-movement.[9] This means that perceivers must have an understanding of the effects of movement on sensory stimulation and be able to exert some control over the movement of sensory apparatus. This limitation is due to the understanding of perceptual experience as a skilful activity. In Chapter 3 I will discuss how this affects the ability of the enactive approach to account for perceptual experiences in certain modalities.

However, within this definition, the enactive approach to understanding perception includes some aspects of action and thought within its scope. Perception, understood as a form of skilful activity, is therefore also a *thoughtful* activity.[10] One of the main claims of the enactive approach is that perception action and thought are inextricably linked, and so therefore the scope of the enactive thesis covers all of these areas to the extent that they are involved with perceptual experience.

With regard to the content of perceptual experience the scope of the enactive approach covers both the qualitative and the quantitative aspects of perceptual content. That is, the enactive approach aims to explain how we come to see the world as having certain qualities, i.e. how things *look*, as well as how we see the world as consisting of certain things, i.e. how things *are*. Noë refers to these two aspects of perceptual content as the *perspectival* and the *factual* dimensions of perceptual content.[11] The scope of the enactive thesis therefore covers all aspects of what may be referred to as *representational* content.

Given that the scope of enactive approach to perception cover all of these aspects then it can also be seen as covering consciousness in general to some degree as well. That is to say that in so far as at least some aspects of perceptual experience are conscious then the enactive approach to understanding perception is also an

[9] Noë, *Action in Perception* p. 2.
[10] Noë, *Action in Perception* p. 189.
[11] Noë, *Action in Perception* p. 168.

explanation of these aspects of conscious experience. However, as Noë concedes, in discussing certain aspects of perceptual experience as conscious experience the enactive approach basically takes consciousness for granted.[12] So while the enactive thesis does not explicitly aim to explain consciousness it does seem to be an explanation of some aspects of consciousness in so far as consciousness is, if nothing else, that part of our mental and experiential life that involves perception and thought.

Finally, the enactive approach is conceived of as a way of understanding all perceptual experience across all sensory modalities. However throughout the exposition of the thesis the examples, case studies and explanations of how we come to have perceptual experience are almost exclusively concerned with visual and tactile perceptual experience. Indeed while tactile perceptual experience is often discussed at length it is fair to say that for the most part Noë and O'Regan's explanation of the thesis is primarily a discussion of visual perception. The other sensory/perceptual modalities are only discussed briefly in an offhand manner in no more than a few pages and passages in their work. Although they assert that the enactive approach can explain perceptual experience equally well for all the perceptual modalities the fact that they do not bother to demonstrate how it does so means that the question remains open. In part, my evaluation of the enactive thesis will involve discussing whether or not all perceptual modalities actually do fit within the scope of the enactive thesis. I will also evaluate whether or not the enactive thesis may be a more acceptable approach to understanding certain aspects of perceptual experience if it were to be applied to only some of these aspects of perceptual experience. In short, I will be discussing the question of whether or not the enactive thesis ought to narrow its scope.

[12] Noë, *Action in Perception* pp. 229-30.

1.4 Perception as a Type of Action

One of the core elements of the enactive theory of perception is that perception is a type of action or activity. Noë outlines this position at the very beginning of *Action in Perception*:

> The main idea of this book is that perceiving is a way of acting. Perception is not something that happens to us, or in us. It is something we do. Think of a blind person tap-tapping his or her way around a cluttered space, perceiving that space by touch, not all at once, but through time, by skilful probing and movement. This is, or at least ought to be, our paradigm of what perceiving is. The world makes itself available to the perceiver through physical movement and interaction. In this book I argue that all perception is touch-like in this way: Perceptual experience acquires content thanks to our possession of bodily skills. *What we perceive* is determined by *what we do* (or what we know how to do); it is determined by what we are *ready* to do. In ways I try to make precise, we *enact* our perceptual experience; we act it out.[13]

As can be seen already in this passage, the idea that perception is a type of action has (or can have) several implications: It is (or at least can be) temporally extended, it must involve interacting with the world, it is connected with movements of the body and it is connected to the *intentions* of the perceiver. These implications will be discussed at length later; my only aim in this section is to outline what is meant by the claim that "perception is a type of action".

The claim that perception is a type of action means that it is an *active* process rather than something that passively takes place within the brain. As an action, perception is a type of skill, and skills are something that are learnt. In most cases of perception what is learnt is how to manipulate one's sensory organs in order to gain access to environmental information. (Although this would not include certain types of, what some refer to as perception such as proprioception). Thus perception can be seen

[13] Noë, *Action in Perception* p. 1.

as a form of knowledge. The ability to use this type of knowledge, the ability to use these skills or perform these actions, is, according to the enactive approach, simply the ability to perceive the world:

> The central claim of what I call *the enactive approach* is that our ability to perceive not only depends on, but is constituted by, our possession of this sort of sensorimotor knowledge.[14]

In assessing the claim that perception is a type of action it is important to keep in mind the distinction that, according to the enactive approach, perception is not *for* the guidance of action but is (given the status of) an action in itself. As a type of action it involves bodily movement and mental activity but this does not mean that perception must involve gross body movements. In *Action in Perception* (section *1.4 The Joys of Seeing*), Noë discusses a possible criticism of the enactive approach, one that draws upon the condition known as *Optic Ataxia*, whereby subjects are unable to use their perceptions to guide movement. The crux of this objection is that one can be passive or inert and still have perceptual experiences. Noë argues that *optic axtaxiacs* and para/quadriplegics are still able to move their eyes and that, in fact, the eyes are in constant movement (saccading and foveating) and that stopping these movement would certainly lead to blindness. He also points out that there is evidence that the development of normal vision is dependent upon *self-actuated* movement which leads to the proposal that: “Only through *self* movement can one *test* and so *learn* the relevant patterns of sensorimotor dependence.”[15] This means that the perception, as action, can occur without the perceiver actually moving his or her body but rather by focusing attention on the sensory data that is being received by the sensory organs which can be *moved* if the perceiver wishes to explore another part of the environment. According to the enactive approach it is the knowledge of how to use one’s sensory apparatus in such ways that constitute the act or activity of perceiving.

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[14] Noë, *Action in Perception* p. 2.
[15] Noë, *Action in Perception* p. 13.

Two implications of this approach are that:

1) Only creatures (or things) that have certain kinds of bodily skills and the capacity for self-movement can be perceivers, and:

2) That we should reject the idea that "perception is a process *in the brain* whereby the perceptual system constructs an *internal representation* of the world."[16]

The first point states that in order to perceive one must have a body, perception is a bodily activity. The second point is a rejection of what Susan Hurley calls the input-output view of perception, which is the idea that perception is input from the world to the mind and action is output from the mind to the world.[17] The enactive approach rejects this view because, Noë argues, it is not possible to separate perception, action and thought. Thus, according to the enactive approach, to conceive of and define perception as a type of action is also to conceive of action as a process that involves thought and to conceive perception as a type of *thoughtful activity*.

1.5 The Enactive Account of Sensation and Perception

This entire thesis is, obviously, concerned with the enactive approach to understanding perception. In this section my aim is to sketch out the way that Noë defines sensation and perception in order to clarify what is meant by these terms as Noë understands and uses them. The two main points of difference between the two, according to Noë, turn on different uses of the concept of understanding (or awareness/knowledge). Noë believes that, in at least most circumstances, perceptual experience cannot take place in the absence of sensory data, and also that raw sensory data does not in or of itself amount to perceptual experience.

One sense in which the concept of understanding is used to differentiate sensation and perception is that raw sensory data does not give rise to perceptual

[16] Noë, *Action in Perception* p. 2.
[17] Noë, *Action in Perception* p. 3.

experience in an organism unless that organism is aware of that sensory data, understands what that data refers to, understands that they have access to that data and acts upon that data. This sort of awareness is to be understood in this case as the awareness of something in particular:

> [A] person (or system or machine) is perceptually aware of something if the system makes use of perceptual information about the thing for the purpose of planning, rational thought or linguistic behaviour. This definition of awareness has also been used by Chalmers (1996) – it corresponds to what Block (1995) calls "access-consciousness".[18]

By linking perception with what others have explicitly referred to as consciousness, Noë and O'Regan are saying that one way to differentiate between raw sensory data and perceptual experience is that one is not conscious of all (potentially conscious) sensory data but one is, conscious (in some sense at least) of perceptual data. In other words, one *uses* perceptual information in certain decision-making and cognitive activities whereas raw sensory data is not necessarily used in this way.

The other way to distinguish between sensation and perception, and the more important distinction for the enactive approach, is that sensory data is considered to be perceptual if one *understands* how that sensory input will be affected by the use of sensory organs as well as gross bodily and object movements. This use of the concept of understanding refers to how one understands how the sensory data will or can change due to movements rather than what that sensory data refers to. To be a perceiver, according to the enactive approach:

> [Y]ou must understand, implicitly, that your perceptual content varies as things around you change, and that it varies in different ways as you move in relation to things around you.[19]

Understanding how sensory input will change as a result of movement is the most important aspect of the enactive approach, which argues, that it is by having this sort of

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[18] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," p. 94.
[19] Noë, *Action in Perception* p. 169.

understanding that we *enact* the content of our perceptual experience. The way that we understand how sensory data changes in these ways is, according to the enactive approach, by exercising our mastery of the sensorimotor skills that provide us with the practical knowledge of the ways that sensory data is affected by sensorimotor activity:

> We shall say that perceivers have sensations in a particular sense modality, when they *exercise their mastery of the sensorimotor laws* that govern the relation between possible actions and the resulting changes in incoming information in that sense modality.[20]

I will discuss in detail in the following sections, and throughout this thesis, how this type of understanding is supposed to constitute perceptual experience according to the enactive approach. The basic idea is that, when you see or hear something, you understanding that moving towards or away from that thing will affect sensory stimulation in certain ways that will make the thing appear larger or smaller, louder or quieter. The idea that we understand how these changes in sensory stimulation are affected by such movements, and by movements of the objects themselves, is one of the core features of the enactive approach to perception. This idea is practically the catchcry of the enactive approach: “To be a perceiver is to understand, implicitly, the effects of movement on sensory stimulation.”[21] Although I started this section by suggesting that one way of perceiving involves understanding what sensory stimulation refers to, the enactive approach actually goes further and argues that you know what sensory data refers to *because* you understand that certain movements will bring other aspects of the object into view. Full-blown perceptual activity (usually) involves both types of understanding as well as (usually) involving sensory data.

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[20] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," p. 82.
[21] Noë, *Action in Perception* p.1

1.6 Sensorimotor Contingencies and Sensorimotor Skills: The Enactive Account of Perception as Sensorimotor Knowledge

The enactive account of perceptual experience emphasises the relationship between the perceiver, their sensory apparatus and the environment as the crucial components that give rise to perceptual experience. The enactive theory refers to the variables in this relationship as the *sensorimotor contingencies*. One of the difficulties in determining what is meant by this term is that at times Noë to uses the terms "sensorimotor skill," "sensorimotor dependence," and (sometimes) "sensorimotor knowledge" as interchangeable with "sensorimotor contingency."[22] Although some of these terms refer to different aspects of perceptual experience they all refer, in some sense, to sensorimotor contingencies.

An important point to bear in mind in understanding the enactive approach is the claim that these sensorimotor contingencies do not merely have a bearing on or a causal relation to perceptual experience but that they actually are, in some way, *constitutive* of perceptual experience. Recall that Noë states this clearly early on:

> The central claim of what I call *the enactive approach* is that our ability to perceive not only depends on, but is *constituted* by, our possession of this sort of sensorimotor knowledge.[23]

One of my main aims is in this thesis is to analyse this claim to determine whether or not sensorimotor contingencies are constitutive of perceptual experience in the way that Noë claims. Although perceptual experience does not occur without a perceiver and world that stand in certain sensorimotor-contingent relation/s, the claim being made by Noë is that these relations are constitutive of perceptual experience. In a footnote to the above quote Noë acknowledges that the enactive approach has been previously been referred to as the "sensorimotor contingency theory" (in work with O'Regan) and

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[22] At other times different formulations will be used such as "sensorimotor laws", "patterns of sensorimotor activity", "sensorimotor profiles", "phenomenal shape (p-shape)", "sensorimotor relations," etc.

[23] Noë, *Action in Perception* p. 2. Emphasis added on "constituted".

the “dynamic sensorimotor approach” (in work with Hurley).[24] This shows that the theory itself has evolved from and has at its core a thesis built on a certain understanding of the connection between a perceivers sensorimotor relationship to their environment and their perceptual experience. In the same footnote Noë acknowledges that he has taken the term “enactive” from Varela and Thompson where it is used to refer to their non-representational thesis of mind and perceptual activity of embodied creatures who are coupled to their environment.[25] By using this term Noë is also making clear that he intends to stress these aspects of his understanding of perception and that he intends to argue that it is the sensorimotor contingencies that constitute this coupling and, therefore, are constitutive of perceptual experience.

1.7 Movement and Object related Sensorimotor Contingencies

Noë identifies two different types of sensorimotor contingency; *movement* and *object* related sensorimotor contingencies. These two types of sensorimotor contingency are intended to cover all of the aspects of the relationship between a perceiver’s sensory organs and their environment. Noë argues that touch is the best paradigm for understanding perception, so therefore, all perception is dependent on movement just as touch is. The enactive theory does not maintain that these sensorimotor contingencies constitute perceptual experience by themselves, they are necessary but not sufficient conditions. My purpose in discussing them here is to try to get a clear idea of what the enactive theory holds to be the source of our perceptual experience, or at least in Noë’s account.

Before going on it is worth considering what exactly we are referring to when discussing sensorimotor contingencies. Sensorimotor contingencies are lawful changes in sensory stimulation that are in part constituted by upon *controllable* movement. Perceivers stand in a certain relationship to their environment, this relationship

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[24] Susan Hurley and Alva Noe, "Neural Plasticity and Consciousness," *Biology and Philosophy 18(1): 131-168, 2003* (2003), Noë, *Action in Perception* p. 233 ft. 1.
[25] Francisco J. Varela, Evan. Thompson, and E. Rosch, *The Embodied Mind* (Cambridge, MA.: The MIT Press, 1991).

determines what can be perceived; e.g., you can not see what is behind you. Changes in sensory stimulation occur due to certain changes in this relationship; e.g., you have to turn around in order to see what is behind you. In this way, changes in the patterns of sensory stimulation are governed by laws that describe the way that certain actions or movements will result in certain changes. Action X will result in changes to sensory stimulation of the type Y: e.g. “looking to the left” will result in the sorts of changes that result from turning the eyes and/or head to the left.

These laws fall into different classes, of which Noë identifies two general types; movement- and object- related sensorimotor laws. For Noë (and O’Regan) perceptual experience is dependent upon and constituted by one having a practical/working knowledge of these sensorimotor laws:

> We shall say that perceivers have sensations in a particular modality, when they *exercise their mastery of the sensorimotor laws* that govern the relation between possible actions and the resulting changes in incoming information in that sense modality.[26]

Movement related sensorimotor contingencies are those that are governed by movement related sensorimotor laws. Here, “movement” refers to actual or potential movements that can be made by the perceiver (and/or their sensory apparatus):

> *Movement-related* sensorimotor contingencies are patterns of dependence between sensory stimulation, on the way hand, and movement of the body, on the other.[27]

This means that, at any given time, one’s sensory apparatus is stimulated in a certain way and how that stimulation changes is contingent upon the ways that the perceiver is able to move their sensory apparatus and their body. As a simple example (adapted from Noë), imagine that you are standing in front of a large cube. From your position you can see one side of the cube which appears simply as a square. Using your eyes,

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[26] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," p. 82.
[27] Noë, *Action in Perception* p. 129.

by moving them, you can focus on the centre, edges or corners of this face of the cube (as parts of a square). These changes and the accompanying changes to patterns of sensory stimulation are determined by the way that you move your eyes. Now imagine that you start to move around the cube. As you do so parts of the adjacent side come into view, you will now see the edge of the face of the cube that you were looking at as the edge of a cube and you will be able to see two faces of the cube. You can focus on this corner, which will leave the far edges unfocused in the periphery of your vision, or you can focus on one side of the cube which will push the other side (and to some extent the corner as well) into the periphery of your visual field. Continuing to move around the cube will have the affect that the side you began looking at will disappear from view and you will be once again faced with a square side of the cube. These changes in sensory stimulation vary according to the sensorimotor laws that describe the way that such movements affect sensory stimulation. The knowledge (or practical mastery) one has of these sensorimotor contingencies form the expectations that one has that moving the eyes or the body in these ways will produce these kinds of changes in sensory stimulation. Performing these types of movements demonstrates that you are in possession of the knowledge (as practical skill) of sensorimotor contingencies that allow you to bring different parts of the visual field into focus by performing the appropriate movements.

Movement related sensorimotor contingencies/laws are also those which are related to the three dimensional nature of space. According to Noë and O'Regan certain laws apply to the movement-related sensorimotor contingencies because "the visual apparatus is sampling two-dimensional projection of three-dimensional space."[28] These laws describe the expanding or contracting "flow-field" on the retina and are related to the inverse square law.

The other class of sensorimotor contingencies that are identified by Noë and O'Regan are the object-related sensorimotor contingencies. This class of sensorimotor

[28] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," p. 86.

laws describe the sensorimotor contingencies that are related to the actual and possible movements that can be made by objects. These sensorimotor laws refer to the nature of objects themselves rather than the perceiver's sensory organs or the three-dimensional nature of space.[29] For example, if a coffee mug is turned in front of you, the handle will come in and out of view as the mug is turned around, a glass or a brick will not change in appearance in this way. In the example of the cube used above, if the cube were to move rather than the perceiver then, presumably, the perceptual experience of the object would vary in similar or identical ways whereas the perception of the background (e.g. the room around it) would not as it is not moving and neither is the perceiver. According to the enactive theory of perception one must understand these object related sensorimotor contingencies in order to perceive objects. That is to say that one would not understand the changes of sensory input that occur while looking at an object unless one understands the object related sensorimotor contingencies.

Earlier expositions of the enactive theory seem to suggest that movement-related sensorimotor contingencies are constitutive of sensory experience while object-dependent sensorimotor contingencies are constitutive of perceptual experience. What suggests this to me is that in their paper: *"What it is like to see: A sensorimotor theory of Perceptual Experience"*, they describe movement/apparatus-related and space-related sensorimotor contingencies in section two titled "Sensation", while the object-related sensorimotor contingencies are described in section three titled "Perception."[30] In the section on *sensation* they state that:

> We shall say that perceivers have sensations in a particular sense modality, when they *exercise their mastery of the sensorimotor laws* that

[29] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," p. 88.
[30] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience."

> govern the relation between possible actions and the resulting changes in incoming information in that sense modality.[31]

Compare this to what they state in the section titled *perception*:

> We suggest that *perception* could be considered to be the exercise of mastery… of object-related sensorimotor contingenc[ies].[32]

This last statement should not be taken to mean that one could have perceptual experience in the absence of sensory abilities but it does lead to the conclusion that perception is not possible without the requisite skills that would be considered to be mastery of object-related sensorimotor contingencies. This in turn leads to the conclusion that perception is constituted by both movement- and object-related sensorimotor contingencies. In later expositions the claim that both are required is emphasised and therefore should be taken to be the more considered version of the enactive thesis.

This conclusion is supported in the earlier work by an example of what perception is that follows the previous quote. In this example they describe a game in which an object is placed in an opaque bag and the players must guess what it is. They say that:

> The striking aspect of this game is that at first, when you have not yet identified the object, you are aware of local bits of texture, protuberances, edges, etc., but not of holding a particular object. Suddenly however, the "veil falls", and the previously unrelated parts come together into a whole. You no longer have the impression of a collection of incomprehensible protuberances, smoothnesses, edges, but of holding, say, a Swiss army knife. It is worth playing this game in order to understand this sudden feeling of recognition, like an illumination. Once the illumination has occurred, you no longer feel the local sensations that you were feeling before, but you feel the object as a whole object…

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[31] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," p. 82.
[32] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," p. 88.

> We suggest that this feeling of presence derives from the fact that once the object has been recognized, you "have tabs" on it, you can exercise your mastery of the way it "behaves" under your grasp…
>
> It is this knowledge which *constitutes* the haptic perception of the object. In fact you need not do anything at all, and yet you have the acute feeling of holding a Swiss army knife.[33]

In this example, the person playing this game at first "perceives" (or perhaps "senses" is better – they are not clear on this) various parts/aspects of the object by using movement-related sensorimotor skills. That is to say that one receives sensations from the object that are interpreted in terms of how the stimulus affects the sensory apparatus. It seems that one only actually *perceives* the object once one has recognised it. When one has recognised it one can then use their movement- and object-related sensorimotor skills to exert some control over the object and the sensory stimulation one receives from it. So it is only when one uses both movement- and object-related sensorimotor skills that one actually perceives according to the enactive/sensorimotor contingency theory of perception.

Noë makes this connection explicit when describes our sensorimotor relations to the world:

> Our sensory relation to the world varies along two dimensions. The relation is *movement*-dependent when the slightest movements of the body modulate sensory stimulation. But when you see an object, your relation to is also *object*-dependent; that is, movements *of the object* produce sensory change. In general, when you see x, your relation to it is both movement- and object-dependent… To perceive an object, in general, is to deploy sensorimotor skills of both sorts; perceivers are familiar with not only the sensory effects of movement, but also the sensory effects produced by environmental changes.[34]

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[33] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," p. 88.
[34] Noë, *Action in Perception* pp. 64-65.

In this passage Noë makes it clear that perceptual experience is, in general, constituted by both sorts of sensorimotor contingencies. My understanding of the way that the enactive theory describes perceptual experience as constituted by sensorimotor contingencies is that movement- and object-related sensorimotor contingencies can produce similar or identical changes in sensory stimulation. This being the case then it is unclear which type/s of sensorimotor contingencies constitute which (aspects of) perceptual experience and why it is necessary to go to such lengths to distinguish them. Although having said that, the advantage of distinguishing different sensorimotor contingencies is that it gives the enactive theory the ability to distinguish between changes in sensory stimulation that can be described as *mere* sensation from those that are fully perceptual. This is more evident in the earlier expositions of the theory. It also allows the enactive theory to describe which aspects of perception are under the control of the perceiver and which aspects are not.

Given that most perceptual experience involves both kinds of sensorimotor contingencies, not only does it make sense for the enactive theory to define perceptual experience as constituted by both kinds of sensorimotor contingencies it also makes sure that the enactive theory avoids unwanted and counter-intuitive conclusions. The previous quote from Noë follows a discussion on the problem of perceptual presence. The upshot of this discussion is that one possible reading of the enactive theory leads to the conclusion that a room that is adjacent to the one that you are in is present to perceptual experience because your relationship to it is governed by movement-related sensorimotor laws. Insisting upon both types of sensorimotor contingencies to constitute perceptual experience allows the enactive theory to rule out this conclusion because object-related sensorimotor contingencies do not constitute perceptual experience of the room next door. That is to say that movements of objects in that room will not cause any changes to sensory stimulation. On the other hand, the “back” of an object that is in front of you is perceptually present because your relation to it (and your perceptual experience of it) is constituted by movement- and object-related sensorimotor contingencies. That is to say that if you or the object moved then such

movements would cause changes to sensory stimulation. And this is precisely the conclusion that the enactive theory of perception endorses. In my opinion the enactive theory should endorse the thesis that genuinely perceptual experience is constituted by both types of sensorimotor contingencies. Although there is no clear reason given as to why Noë has left open the theoretic possibility of perceptual experience being constituted by one type it seems as if he does so to account for certain strange phenomena (e.g. experiences created in perceptual experiments) and to shield the enactive approach from certain forms of attack. If the enactive theory of perception does not endorse the thesis that genuinely (normal) perceptual experience is constituted by both types of sensorimotor contingencies (perhaps to varying degrees of each type depending on the type of experience) then it owes us an account of which ones matter and why. In what follows when I discuss sensorimotor contingencies or sensorimotor laws etc. I will mean both kinds unless otherwise stated. The rest of this thesis will be concerned with the claim that perception is constituted by our knowledge of sensorimotor contingencies. More details of how this is proposed to be the case will emerge throughout, my aim here being to give a brief outline of what these sensorimotor contingencies are and how they are supposed to constitute perceptual experience.

1.8 Sensorimotor Contingencies and Conceptual Knowledge

The enactive theory of perception claims that perceptual experience is constituted by our knowledge of sensorimotor contingencies. This claim is often stated in terms of “exercising practical mastery of the laws of sensorimotor laws” or “possession of sensorimotor knowledge”. This raises the question of what sort of knowledge this is and how it is used. These issues will be discussed at length throughout this thesis.

The enactive theory draws upon Wittgenstein’s insight that understanding and using a concept may be more like using a practical skill than we sometimes suppose.

> As Wittgenstein's (1953) considerations on rule following suggest, at the base of our conceptual practises are conceptual skills that do fit [the] Socratic or Fregean model.[35]

The claim here is that we don't have to know what physical properties instantiate a thing being red, or what *metamathematical* properties make a *modus ponens* argument valid, in order to determine that such a thing is red or such an argument valid. The point is that we often do not bring explicit conceptual knowledge into consideration when we make judgements or come to certain conclusions as to how things are in the world. The enactive theory maintains that this form of primitive and practical conceptualising of the way that the world is presented in experience is a fundamental part of the skills that are used in the process of engaging the world and having perceptual experiences via a process of skilful activity. When the enactive theory states that perceptual experience is constituted by knowledge of sensorimotor contingencies this knowledge is to be understood as this sort of basic or practical conceptual knowledge.

According to the enactive theory of perception sensorimotor knowledge is also tacit, non-propositional knowledge.[36] In this sense sensorimotor knowledge is a type of practical form of knowledge rather than an analytical or theoretical form of abstract knowledge or thought or a linguistic type of rational knowledge. It is *know-how* rather than a *know-that*. It is *a posteriori* knowledge rather than *a priori*. This is why Noë often uses the terms "sensorimotor knowledge" and "sensorimotor skill" interchangeably. For Noë, sensorimotor knowledge just is a practical kind of skill such as knowing how to ride a bike. Noë argues that some practical skills, some sensorimotor skills, just are simple concepts or "proto-conceptual" skills.[37] These skills are basically the skills that we possess that allows us to use our sensory organs and to understand how changes in sensory stimulation result from movements of these organs or of objects in the world. How these skills, how this knowledge, constitutes perceptual experience and what effects that has on the content of perceptual experience will be discussed later. My aim

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[35] Noë, *Action in Perception* p. 186. Noë refers to Wittgenstein's *Philosophical Investigations*, sec. 201
[36] Noë, *Action in Perception* 118-19.
[37] Noë, *Action in Perception* pp. 183 and 99.

here is simply to explain that when Noë uses these terms he means a form of knowledge that is practical and skill-like, or skills that are conceptual, rather than propositional or other forms of knowledge.

1.9 Phenomenology or Perceptual Content?

The enactive theory of perception asks us to embrace the claim that perceptual experience is constituted by active, skilful, cognitive and complex processes. It argues that our perceptual experience is constituted by our possession of a type of knowledge which takes the form of a set of practical skills. In order to judge whether or not the enactive approach to perception successfully describes the way that we have perceptual experience then we must determine what aspects of experience the enactive approach actually describes and decide if this is a complete account of perceptual experience. In this and the following section I will outline what the enactive approach describes and return to the question as to whether or not this is a complete account later in this thesis.

As I discussed above, the enactive theory is motivated by research into the mechanics of sensory organs as well as other perceptual phenomena. It is also vehemently opposed to representationalist conceptions of perceptual experience. As such it is, on one level, an account of perception that holds that the content of experience is not very detailed or fine-grained.

On the other hand, the enactive approach is an attempt to explain why it *seems* to us that we perceive the world in a detailed and complete way even though we do not. That is, it is an attempt to explain the phenomenology of our perceptual experience (that does seem to be detailed and complete) despite the limitations of our perceptual apparatus.

The enactive approach argues that thanks to our mastery of sensorimotor contingencies we are able to keep tabs on environmental information which we can access when required, that we know how to access this information, and that in the case of visual perception we can access this information so fast that it seems as we possessed this information all along. This argument is motivated by the idea that the world acts as its own best model and as the storehouse or memory of its own information. O'Regan explains the activity of seeing in this way:

> "Seeing" does not involve simultaneously perceiving all the features present in an object, but only a very small number, sufficient to accomplish the task at hand. The subjective impression we have of seeing **whole** objects arises first because the retinal stimulation is very rich and so provides the impression that "a lot of stuff is out there", and second because if at any moment we want to know what exactly any of that "stuff" is, we just use our retinas and eye movements to "find out".[38]

O'Regan bases his view on the science that shows that we only really ever actually perceive a small amount of what is present in the field of vision. O'Regan argues that the subjective richness of visual perception is in fact illusory but an illusion maintained by the fact that any questions we may have about items in the visual field can be immediately answered simply by focusing on the relevant aspects of the visual field. I will discuss whether or not this is an accurate description and a good explanation for the phenomenological content of experience later.

The sensorimotor/enactive theory of perception is, to a large extent, a reaction to and an attempt to explain visual perception in light of the fact that our visual apparatus (eyes) and our conscious visual experience does not present the world to us as uniformly detailed and in high resolution and yet, it *seems* to us that the world does appear to us in this way. Noë argues that the reason why it seems to us the content of our visual perceptions is detailed and high resolution is because the content of our

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[38] J. O'Regan, "Solving the "Real" Mysteries of Visual Perception: The World as an Outside Memory," *Canadian Journal of Psychology Vol 46(3) Sep 1992, 461-488* (1992): p. 481.

perceptions is what he calls “virtual content.” Noë argues that if the content of visual perception is thought of as virtual content then it is possible to understand the phenomenology of perception without needing to posit or accept that such content is constituted by processes in the brain such as “filling-in.”

This is not to say, however, that Noë believes that vision is as detailed and complete as it would need to be if perception consisted of a series of snapshot-like (internal) images that are perceived in sequence. Although no contemporary theorist holds the view that we see by seeing internal pictures, Noë argues that many theories still attempt to explain visual experience in similar ways. Noë argues that the proposal that the brain “fills-in” is similar to the type of reasoning that attempts to explain how retinal images are re-inverted and integrated and therefore commits the *homunculus* fallacy.[39]

However, Noë[40] also appears to be drawing on a certain type of “filling-in” to explain how it is that we do perceive the world in the way that it *seems* to us that we do. For Noë, the content of (visual) perception is virtual content. Virtual content is constituted by one’s knowledge of sensorimotor contingencies which, it might be argued, is a form of filling-in. Whether or not it is depends on what is accepted as content on this account as well as what the distinction is between what is accepted as content and what is not. Trying to establish the answers to these questions is complicated by the fact that Noë seems to hold a number of different and incompatible positions on these issues. Using the blind-spot as an example, these positions are as follows:

1) We do not see the blind spot. We do not receive any sensory information from that area of the visual field and so therefore do not experience or perceive whatever is on that area.

[39] Noë, *Action in Perception* pp 46-47.
[40] Alva Noë and Evan Thompson, "Are There Neural Correlates of Consciousness," *Journal of Consciousness Studies 11(1): 3-28, 2004* (2004): 46-47.

2) We do perceive what is in the blind spot. Perception is a temporally extended activity, and given that we know how to gain access to information from the blind spot, thanks to our knowledge of sensorimotor contingencies, we do perceive and have experience of the blind spot, which we experience as virtual content, because;

3) Knowledge of the sensorimotor contingencies is what *constitutes* conscious visual perception.

In chapter 2 I will examine each of these positions to evaluate to whether or not knowledge of sensorimotor contingencies is a form of filling-in and if that in turn would mean that the position that the enactive theory ends up positing is a consistent and tenable position to hold on the nature of perceptual/phenomenological content.

Noë also proposes the thesis that the content of perceptual experience is in fact two types of content that are present in any or at least most perceptual experience. Noë refers to these aspects of perceptual experience as “dual content”. This aspect of the enactive theory is designed to capture, explain and describe the way that (according to Noë) when we perceive something we perceive both the *actual* shape and size (etc.) of objects as well as the shape and size of things as they *appear* to us. Noë does not claim that we ordinarily pay close attention to how things appear (which he refers to as the “phenomenal-profile” or “phenomenal-shape” – “P-shape” – or “sensorimotor-profile”) but that we can do so if we want to, for example if we are trying to draw something. Noë describes these aspects of perceptual experience and content in this way:

> Perceptual content – what philosophers call representational content, or *how* the experience presents the world as being – is two-dimensional. It can vary along a *factual* dimension, in regard to how things are. And it can vary along a *perspectival* dimension, in regard to how things *look* (or appear) from the vantage point of the perceiver. Visual experience always has both these dimensions of content. This corresponds to the fact that perception is, at once, a way of keeping track of how things are, and also

> of our relation to the world. Perception is thus world-directed and self-directed.[41]

Noë argues that these aspects of perceptual experience are the act of finding out how things in the world are from how they appear:

> Perceiving how things are is a mode of experiencing how things appear. How they appear is, however, an aspect of how they are. To explore appearance is thus to explore the environment, the world. To discover how things are, from how they appear, is to discover an order or pattern in their appearances. The process of perceiving, of finding out how things are, is a process of meeting the world; it is an activity of skilful exploration.[42]

I will discuss at length later whether or not this is in fact an accurate account of how we come to have perceptual experience and whether or not it actually describes the phenomenology of experience.

1.10 Embodiment, Embeddedness and Extension

Obviously the enactive approach to perception entails that perceiving subjects are embodied subjects who are embedded in their environment and extended into the environment. One of the major claims of the enactive approach is that perceptual experience is constituted by our practical mastery of sensorimotor contingencies, which means, in short, that we know how to use our sensory apparatus. In other words it is a necessary condition of perceptual experience that the perceiving subject be embodied in such a way that they have sensory apparatuses and that changes in sensory stimulation are the result of actual or possible movements of these apparatuses.

Embeddedness and extension of perceptual experience are also logical consequents of the enactive approach for the reason already discussed (i.e. object-related sensorimotor contingencies), but it must also be borne in mind the enactive approach places a particular emphasis on the impact this has on perceptual

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[41] Noë, *Action in Perception* p. 168.
[42] Noë, *Action in Perception* p. 164.

experience. The enactive approach argues that the phenomenology of perception is due to the embedded and extended nature of perception:

> Of course it *does* seem to us as if we have perceptual access to a world that is richly detailed, complete, and gap-free. And indeed we do! We take ourselves to be confronted with and embedded in a high-resolution environment. We take ourselves to have access to that detail, not all at once, but thanks to movements of our eyes and head and shifts of attention.[43]

The enactive approach to experience argues that we seem to experience the world as complete, detailed and gap-free because that is exactly how the world is and it is this world that we experience. In other words we perceive the world as complete, detailed and gap-free because when we perceive we perceive the world rather than any sort of representation "in the head". The content of experience is in this sense "extended" in that it actually exists in the world and we are embedded in this world. The content that we have access to is all around us, as is the content that we *can* see.

The enactive approach also places an emphasis on the temporally extended nature of perceptual experience/activity. So even though we may not be able to experience all of the detail of the one world in any one perceptual moment we can, over time, access all of this detail when required through the process of perceptual activity. So the enactive approach claims not only that perceptual experience is extended into the world but also extended through time. These aspects of our perceptual experience lead Noë to describe this sort of content, indeed most content of perceptual experience, as "virtual content."

[43] Noë, *Action in Perception* p. 57.

1.11 Is the Enactive Approach Opposed to Representationalism?

Noë presents the enactive approach as a vehement attack on representationalist conceptions of perceptual experience. The type of representationalist (conception) he has in mind is a caricature of a Cartesian dualist that thinks of perception as the act of constructing pictorial mental images constructed from sensory data, perhaps viewed by a homunculi. Perhaps "ordinary" or "lay-folk" may hold something like this view, however there just simply is not any current theorists in this area who hold anything like this view. In effect Noë is attacking a straw man or a phantom.

On the other hand Noë allows that the brain and internal brain states do play a major role in perceptual experience, but he does argue that the brain alone is not sufficient for perceptual experience. This leads Noë to argue that the phenomenology of dreams and mental imagination is the way it is precisely because these states are produced inside the brain.[44] Given that Noë does allow for certain forms of mental representation it will be one of the tasks of the thesis to determine whether or not mental representation can or does play a role in normal perceptual activity, and if so, in what way. Although it seems that Noë wants to rule mental representation out he does seem to leave the door open with comments such as this:

> Does experience supervene on internal states of the brain?" The correct answer ought to be "maybe." I have argued that what we experience outstrips what is represented in consciousness. This *does not* entail that what we experience outstrips what is represented in our brains. However it does remove the major theoretical obstacle to entertaining the possibility that experience might supervene not on the brain, but rather on brain-animal-world systems.[45]

[44] Noë, *Action in Perception* p. 214.
[45] Noë, *Action in Perception* p. 218.

So it seems that the sensorimotor contingency theory may be compatible with some form of a representational theory.

One of my aims in this thesis will be to determine whether or not this is the case. In doing so I will not be attempting to incorporate "snapshot" representations into the enactive approach but rather I will argue that certain brain states carry information that can be described as representational and which are involved in perceptual experience. Representational models of perception do not necessarily imply that the "representation" is image-like at all, nor do they necessarily imply that there is *homunculus* in a Cartesian theatre. A representational model of perception does not need to maintain that a perceiver "views" their mental representations but only that the perceiver's ability to view external objects is supported by neural features or brain states that function as a representation of the scene. As the enactive approach argues that perception is constituted by "knowledge of sensorimotor contingencies", and that this knowledge must obviously be, at least partly, constituted by a brain state of some form, then the enactive approach is compatible with this type of representational model of perception. Noë and O'Regan accept that perception requires some sort of storage mechanism.[46] The fact that we can remember and reproduce (by drawing etc.) what we have seen (even if not entirely accurately) demonstrate that such a system must exist in some form. In the following chapters I will argue further for the need for such a mechanism, provide evidence of how such a system might work in certain modalities and argue that such a storage mechanism could operate, or perhaps *represent*, the environment in sensorimotor terms.

[46] J. Kevin O'Regan and Alva Noë, "Acting out Our Sensory Experience," *Behavioral and Brain Sciences* 24, no. 05 (2002): p. 1018.

1.12 Conclusion: The Key Features of the "Enactive" or "Sensorimotor" Approach to Perceptual Experience

Noë and O'Regan are not alone, nor are they the first, to enunciate a sensorimotor based theory of perceptual experience. They are however the most prolific contemporary exponents of this type of understanding of perceptual experience and in many ways the most extremely committed and controversial contemporary exponents. It is for these reasons that I have selected their account of it for analysis in this thesis. In this opening chapter I have discussed my understanding of their version of the sensorimotor thesis, which will be subjected to critique and analysis throughout the remainder of the thesis. As I have said, their version seems to me to be intuitively plausible in many ways. I do however recognise that in some ways they seem to take their intuitions too far without due attention to the phenomenology of perceptual experience, and make claims that are open to justifiable criticism. These issues will be considered in throughout the thesis and where their account is found wanting I will be offering suggestions as to how the enactive/sensorimotor thesis ought to be reworked so as to address these concerns.

In doing so I will be trying to remain as true as possible to the spirit and core insights of the enactive approach to develop an account which satisfies the aims that Noë and O'Regan aspire to, and to which all theories of perceptual experience ought to aspire, namely that it be both phenomenologically apt and explanatorily adequate.

The key features of their version of the enactive approach – the features that will be analysed in this account are as follows:

- Perception is a type of action, or rather an activity, which is a skilful engagement with the world by an embodied subject in which it is embedded in and extended into the environment.
- Perception is a temporally extended activity, a process of engagement rather than a process of generating internal mental representations.

- Perception is constituted through lawful interactions with the environment that are governed by the way that movement affects the process of perceptual experience. (Sensorimotor contingencies).
- Perception is the awareness of access that we have to environmental information that we consider to be useful towards achieving our goals such as planning, rational thought and linguistic behaviour as well as navigation and recognition.
- Perception is paradigmatically understood in terms of the way that the mechanics of the modality of touch.
- Perception is the process in which we access environmental information as standing for itself as an external memory store.
- Perception does not generate, use or require mental representations as part of the process.

Whether or not a sensorimotor thesis can maintain all of these tenets in the very strong sense in which Noë and O'Regan have argued that they must, unchanged and in a non-contradictory or otherwise implausible manner will be assessed throughout this thesis. It will however, be my aim not to dilute any of these main insights unnecessarily, but I will be questioning whether or not these ideas can be applied to all perceptual experience – as Noë and O'Regan claim that they can – while maintaining a strict adherence to the aim that the theory be both phenomenologically apt and explanatorily adequate.

2 Perceptual Content and The Enactive approach to Perception

> The dining room and library of my recollections were now (the dividing wall having been torn out) one large ruinous room, with pieces of furniture scattered here and there. I will not attempt to describe them, because in spite of the pitiless white light I am not sure I actually saw them. Let me explain: In order to truly see a thing, one must first understand it. An armchair implies the human body, its joints and members; scissors, the act of cutting. What can be told from a lamp, or an automobile? The savage cannot really perceive the missionary's Bible; the passenger does not see the same ship's rigging as the crew. If we truly saw the universe, perhaps we would understand it.
>
> - Jose Luis Borges

2.1 Perceptual Content and The Enactive Approach

Any theory of perceptual experience is in effect a theory of the *contents* of perceptual experience. This may seem like an obvious thing to say; as to describe any system or process generally involves a hypothesis as to what is happening to the system and/or what the process is leading to. However, perceptual experience, especially visual experience, has proven to be difficult thing to explain for a number of unique reasons. The task of the theorist of perceptual experience is to explain how such a thing as the (human) body can come to have such experiences. This often leads to the hypothesis that there must be some system or process within the brain that

somehow turns the limited, distorted and confused input from the senses into the cohesive and comprehensible perceptual content that we experience. Further to this is the problem of explaining the phenomenological, qualitative, or *felt*, aspects of experience. This has led many to believe that there is an *explanatory gap* that we confront when we attempt to explain the content of experience.[47]

Noë and O'Regan claim that the enactive theory can explain how we come to have perceptual experiences in the way that we do, and why it seems to us that perceptual experience is uniform and highly detailed, without mental representations. The claim is that perception, as the practical mastery of the laws of sensorimotor contingency, provides the perceiver with access to all of the details of the environment. In other words, it is because of the *way* that we perceive the environment that it seems to us that we perceive the environment in rich detail. But, on the other hand, they do not claim that we have access to all of this detail all at once.

As Noë expands on these claims in his description of the perceptual process it becomes difficult to know what exactly he takes to be the contents of perceptual experience. Firstly, he claims that perceptual experience is constituted by our knowledge of sensorimotor contingencies. Secondly, he accepts the results of recent research that indicates that our sensory apparatuses can only receive a limited amount of sensory input, which limits perceptual content. And thirdly, he argues that we have perceptual experiences of a rich and detailed environment because our knowledge of sensorimotor contingencies presents the world to us as "virtual content" which we can access.

The difficulty of determining Noë's understanding of perceptual content comes from the fact that he does not clearly explain the constitutive relation between

[47] For discussion of the problem of the explanatory gap see (among many others): D. Chalmers, "Facing up to the Problem of Consciousness," *Journal of Consciousness Studies* 2/3 (1995), J. Levine, "Materialism and Qualia: The Explanatory Gap," *Pacific Philosophical Quarterly* 64 (1983), Evan. Thompson, "Sensorimotor Subjectivity and the Enactive Approach to Experience.," *Phenomenology and the Cognitive Sciences*. 4, no. 4 (2005).

(knowledge of) sensorimotor contingencies and perceptual experience; nor does he offer much in the way of a description or explanation of what he takes to be the actual phenomenology of perceptual experience. Noë explicitly denies that he holds a "minimalist" position with regard to the nature of the contents of experience. Noë claims that we can have *rich* and *detailed* perceptual experiences because perception is a temporally extended activity and the world – which we experience directly – is rich and detailed. To confuse matters further Noë often appeals to the position of *our ordinary understanding of the contents of perceptual experience* without explaining just what he assumes *we* ordinarily understand it to be. From what he does say, he suggests that *we* take it to be "detailed, complete and gap free… [but] not all at once" and that we are correct.[48] However he also applies the terms "detailed" and "richness" to what he refers to as the "snapshot" conception of perceptual experience. It is not always clear whether Noë takes the *ordinary* view or the snapshot view. Although he claims to be attempting to explain our shared phenomenology of experience, to be phenomenologically apt, there often seems to be a conflict between what many people take to be the phenomenology of their experience and Noë's own beliefs. This leads to the possibility that Noë conflates these different views of the content of experience or at least that the views he ascribes may be overstated. Noë only ever gives detailed descriptions of moments of perception as if they are isolated segments of time. When he does describe a temporally extended perceptual act or activity he does so metaphorically rather than attempt to describe the phenomenology of such acts.

I take the ordinary view of perception to be that perceptual, particularly visual, experiences are detailed but imperfect. I also believe that people ordinarily take the perceptual experiences that involve different sensory systems to have different levels of "accuracy." Finding empirical definitions of terms such as "richness" and "detail" is almost impossible, especially given the fact that many senses are in themselves somewhat abstract. As I will explain later (section 2.3) richness and detail are possible on the enactive account thanks to the temporally extended nature of perception.

[48] Noë, *Action in Perception* p. 57.

Before I do, I will explain how Noë thinks that richness and detail can be achieved without the use of mental representations. Indeed the denial of the use of mental representations is one of the core tenets of Noë's approach.

Noë's denial of the use of mental representations, descriptions of perceptual experience and his commitment to the results of recent studies of visual perception commit his thesis to the possibility of "minimalist" interpretation. His claim that the experiences of subjects using TVSS prosthetic visual apparatuses (discussed in section 2.2 following) ought to be considered as visual experiences shows that he is committed to the possibility that the enactive approach can be applied to a minimalist position with regards to the content of experience.

A major problem in understanding Noë's position is that he does not adequately describe in what sense knowledge is "constituted" by knowledge of sensorimotor contingencies. He argues, in spite of his stated beliefs, that the enactive thesis can be used to explain both minimalist and "richer" understandings of the content of experience. The "richer" understanding of content is aligned with a particular understanding of the contents of experience as "virtual content". The way in which our knowledge of sensorimotor contingencies *constitutes* content as *virtual content* – without the use of mental representations – is never properly explained. In chapter 4 below, I will attempt to provide a coherent account of what virtual content may be and the role that it plays by drawing upon the sensorimotor theory of perception as developed by Bergson.

On the other hand Noë and O'Regan do not claim that the brain plays no role in perceptual experience and accept that a form of memory must play some role. Accepting that such brain/mental states do play a role suggests that "mental representations" (at least as some would use the term) do play a role. This leads to an inconsistency whereby they either are commited to a minimalist position and thereby fail in their objective to describe the phenomenology of perceptual experience or they

are forced to accept a role played by types of mental states which means that they fail in their attempt to provide a direct realist account of perceptual experience.

Either way, the enactive theory needs a more detailed exp[lanation of what exactly our practical mastery of sensorimotor contingencies "constitutes", how exactly it is so constituted; and, the enactive account of perceptual experience needs to precisely explain what sensorimotor contingency related knowledge is important to perceptual experience and why that knowledge is important.

In this chapter I will discuss these aspects of Noë's account of perceptual content and argue that Noë's account does not provide a coherent account of perceptual content. I will argue that Noë's account leads to an inconsistent triad of claims that state that:

Constitution Thesis: *Perceptual experience is constituted by knowledge (know-how) of sensorimotor contingencies*.

Perceptual Minimalism Thesis: *The contents of occurrent perceptual (especially visual) experience are less rich than we ordinarily take them to be*.

Sensorimotor Richness Thesis: *We typically have knowledge of a rich set of sensorimotor contingencies*.

This inconsistent triad suggests that we both do and do not have rich perceptual experience. In this chapter I will demonstrate that Noë is committed to these three positions and examine his account of content as "virtual content," which Noë argues can account for the apparent richness of perceptual experience in spite of the limitations of our perceptual apparatus. I will also discuss whether or not the enactive thesis is incompatible with a representational account of perceptual content.

The enactive thesis argues that perception is a skilful interaction with the world and that the skills deployed in this interaction are a practical form of knowledge, the possession of which constitutes perceptual experience. To summarise: the basic idea is

that, when you see or hear something in the distance, you know that moving towards or away from that thing will *cause* the thing to appear larger or smaller, louder or quieter by modifying the sensorimotor relationship between you and the environment. The enactive approach proposes that perceptual experience is constituted by such knowledge. The claim is that perception is our understanding of how changes in sensory stimulation are affected by bodily movements, and by movements of objects. This claim is the motto of the enactive approach: "To be a perceiver is to understand, implicitly, the effects of movement on sensory stimulation."[49] *Qua* action, perception is a type of skill and skills are practical knowledge that is learnt. Thus perception is also a form of knowledge. The ability to use this type of knowledge is, according to the enactive approach, simply the ability to perceive the world. This is the basis of the constitutive thesis. The constitutive thesis, then, just is the enactive thesis of *how* it is that we come to have perceptual experience.

2.2 The Enactive Approach and Perceptual Minimalism

In order to demonstrate that the enactive theory of perception is phenomenologically apt, Noë and O'Regan discuss various perceptual phenomena and aspects of our perceptual apparatus and experience that call into question common assumptions of the richness of the (phenomenological) content of perceptual experience. Noë and O'Regan use certain case studies, experiments and everyday perceptual phenomena that have provided much food for thought for researchers in various fields that are interested in understanding perception. The ones that they make the most use of in explaining the enactive approach are; "blind-spots", "change blindness" and "inattentional blindness", "filling-in", and, experiments in the use of prosthetic sensory systems such as "Tactile visual sensory substitution (TVSS)", "The Voice", and (real or imagined) "virtual-reality" programs. They accept that the content of occurrent perceptual experience is in fact, minimal, and argue that the enactive thesis supports and explains the findings of research into perceptual phenomena. This leads

[49] Noë, *Action in Perception* p.1

them to hold what I have called the "Perceptual Minimalism Thesis" (above) in regard to perceptual content. For example, Noë tells us that:

> We *don't* have the detailed world in consciousness all at once.[50]

> Crucially, you can no more grasp *the whole scene* in consciousness all at once than see all sides of the tomato at once, or the occluded parts of the cat behind the fence.[51]

> Just as it is not possible to see every aspect of an object from a single vantage point, so it is not possible to experience every aspect of an object's colour all at once, from a single vantage point (as it were).[52]

An easily observable example of how visual perception is affected by human physical properties is the phenomenon known as the "blind spot." The blind spot is a small gap in the visual field caused by a small area in each retina where there are no photoreceptors. This gap can be easily demonstrated by certain examples, such as:

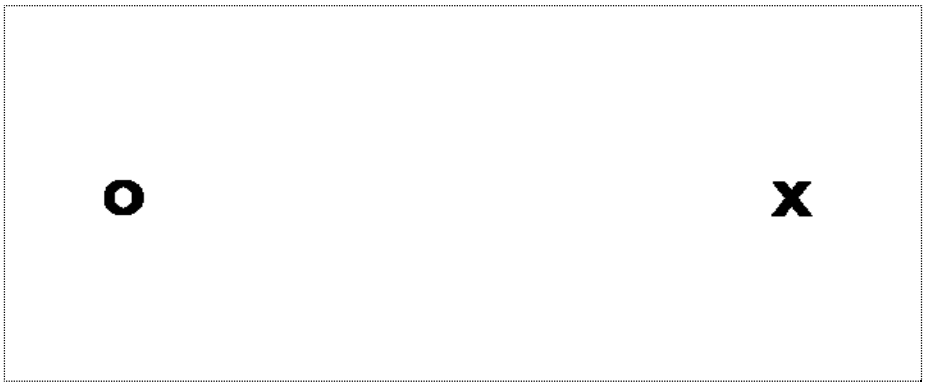

Figure 1: Blind-Spot Demonstration

In this example, closing the right eye and focusing on the cross, or vice versa, and moving towards or away from the page will make the cross or the circle apparently disappear at a certain distance. This has lead to the idea held by some that the brain

[50] Noë, *Action in Perception* p. 51.
[51] Noë, *Action in Perception* p. 134.
[52] Noë, *Action in Perception* p. 128.

must “fill-in” this region. This is a claim that Noë rejects, arguing that “to infer the existence of a filling-in process from the fact that we don’t notice a gap in the visual field… is fallacious; it commits the homunculus fallacy.”[53] By rejecting the possibility of “filling-in” Noë is arguing that we do not use detailed and *complete* or uniform representations in perceptual experience and that the content of perceptual experience is sparse or minimal.

Blind-spots, change blindness and inattentional blindness are visual phenomena that, arguably, demonstrate that visual perception is not as complete and detailed as it is often assumed to be. Noë characterises the orthodox view as of vision as the “snapshot conception”, in which it is often supposed that the “eye is like a camera and that vision is a quasi-photographic process.”[54] A rough caricature of this approach to vision is that it sees vision as a process of receiving sensory/visual information from the retina that is then interpreted by the brain to form a detailed internal representation of the visual scene. The camera is an ideal analogy for this sort of process as it also captures the fact that it often seems to us that vision *seems* to capture whole environmental scenes completely. Research that has revealed that perceivers are highly susceptible to phenomena such as change blindness and inattentional blindness has revealed that we do not have such a complete and detailed representation of the visual field. Also, given that the eye suffers from numerous deficiencies such as the blind spot (as well as differences in retinal cones across the retina, the fact that light is inverted, that we have two eyes, etc.) it is not clear how a mechanism such as the eye and visual system could produce highly detailed complex representations such as those taken by a camera. This has led to those who hold a representationalist view of vision to posit a mental process of “filling-in” whereby the brain fills-in missing information to produce a mental representation of the scene.[55] This has also led to the *Grand Illusion* hypothesis; that we are subjects to a sort of illusion

[53] Noë, *Action in Perception* pp. 48-49.
[54] Noë, *Action in Perception* p. 35.
[55] Alva Noë, Evan. Thompson, and Luiz Pessoa, "Finding out About Filling-In: A Guide to Perceptual Completion for Visual Science and the Philosophy of Perception," *Behavioral and Brain Sciences* 21 (1988).

whereby it *seems* to us that we see all of the detail even though we do not.[56] Noë argues that we are not necessarily the victims of some "grand illusion". Noë uses these examples to support the enactive approach because, he argues, that what these cases show is that we do not use mental representations in vision at all. Noë also argues that the fact that people are not generally surprised by the results of change or inattentional blindness means that we do not ordinarily suppose that the contents of perception are complete and highly detailed and so we are not really the victims of some sort of illusion.[57]

Noë and O'Regan argue that the problem of the blind spot also helps us to better describe our visual phenomenology, in terms of "virtual presence", as well as motivating the idea that touch should be considered to be the paradigm for all perceptual activity. On the one hand, Noë argues that the blind spot acts as a visual occluder, and so, when you experience the "virtual" presence of whatever may be occluded by the blind spot you experience that part of the visual field as present to you in the same way that other occluded surfaces or objects can be said to be present.[58] That is to say that we do not think that we do see what is behind the blind spot, and, when we really focus on the content of a single visual fixation, we find that we are not even committed to the idea that we do experience all of the content of the visual field at once with uniform colour and detail.[59] Noë and O'Regan point out that although there are gaps between one's fingers when one is holding an object one does not experience the object as being just those features that one is touching, one experiences the whole object. According to the enactive approach we experience the whole objects because we know how to move our hands to touch other parts of objects, and so we do not need a mental mechanism to fill-in the missing information for touch or for vision because

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[56] For further discussion of the debate see: Jonathan Cohen, "The Grand Grand Illusion Illusion," *Journal of Consciousness Studies 9(5-6): 141-157, 2002* (2002), Daniel C. Dennett, "Surprise, Surprise," *Behavioral and Brain Sciences* 24, no. 05 (2001), Alva Noë, "Is the Visual World a Grand Illusion?," *Journal of Consciousness Studies 9(5-6): 1-12, 2002* (2002), Alva Noë and J. O'Regan, "Perception, Attention and the Grand Illusion," *Psyche: An Interdisciplinary Journal of Research on Consciousness* 6, no. 15 (2000).
[57] Noë, *Action in Perception* p. 56.
[58] Noë, *Action in Perception* pp. 67-69.
[59] Noë, *Action in Perception* p. 56-57.

objects and the environment contain this information which we have access to.[60] By arguing that perception is constituted by knowledge of sensorimotor contingencies alone, without other mechanisms playing a role, they are describing a very minimalist conception of perceptual experience.

This is also demonstrated by what they say regarding prosthetic (visual) sensory systems. With systems such as “Tactile Visual Sensory Substitution (TVSS)” and “The Voice”, subjects who are blind can be trained to use tactile or auditory cues to navigate or orientate themselves. Prinz argues that these systems do not support the enactive approach because these systems do not produce any sort of qualitatively visual experience.[61] Whilst not suggesting that these experiences are exactly like normal vision, Noë does argue, that these forms of perception should be thought of as *visual*, or as a kind of vision, because these apparatuses respond to and provide the same sort of abstract information; and, that the way that both (or all) types of vision receive this information is determined by the same, or at least very similar, rules of sensorimotor dependence.[62] The point that Noë makes is that, in order to gain access to environmental detail and to navigate ones way around the environment one must use such systems in similar or identical ways to the way in which one uses their normal visual apparatus to do so. Noë does not suggest that there is any sort of qualitative isomorphism between TVSS systems and normal vision but argues that the rules that govern changes to sensory stimulation in both systems are the same. Prinz’s counter example that an anosmic that learns that a fire alarm signifies fire and smoke would not therefore have the olfactory sensation of smelling smoke does not hold because the rules governing the auditory sensation of hearing the alarm do not affect the sensation of smelling smoke. An alarm need not be anywhere near the smoke to alert us of its presence nearby. The alarm might be at opposite end of the building to the smoke and so therefore moving towards it would reduce rather than increase the intensity of the

[60] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," pp. 90-92.
[61] Jesse Prinz, "Putting the Brakes on Enactive Perception," *Psyche: An Interdisciplinary Journal of Research on Consciousness* 12, no. 1 (2006): p. 4.
[62] Noë, *Action in Perception* pp. 111-13.

sensation of smelling smoke for normal perceivers. In short, an alarm does not allow the same sort of self-guided access to exploring environmental information.

Noë argues that mastery of the practical knowledge of these rules of sensorimotor dependence is the way to determine whether a perceptual experience is of one type or another (as well as the way to determine whether or not an experience is a perceptual experience or not). Noë argues that computer generated "virtual reality" systems also support this view because, although we more readily accept that the perceiver's experiences are the same, as opposed to TVSS, they are the same because the perceiver is using the same sensorimotor skills to explore the environment, whether it be real or virtual.[63] In these cases Noë argues that the world is engaged with according to the same rules as normal perceptual engagement. Again, by arguing that perception in constituted solely by knowledge of abstract rules, Noë and O'Regan are describing a very minimalist conception of perceptual experience

Another aspect of visual experience is that it is not uniformly detailed. One way that this can be revealed is by holding a playing card or a coloured item at the very periphery of one's visual field. In this position, one can tell that there is an object there, but one cannot determine what colour it is. This is due to the placement of colour receptors in the retina. Dennett provides a now famous example of the way that one would genuinely think and believe that they see a wall covered with wallpaper that depicts hundreds of pictures of Marilyn Monroe, even though at any one moment you are only ever foveating a few of them. Dennett argues that in cases such as this, or the blind spot, the brain doesn't *fill-in* the missing detail but that it "jumps to the conclusion" that the wall is uniformly detailed.[64] Noë agrees that the brain does not execute a process of "filling-in" environmental detail, but, he argues that when we pay close attention to what we see we realise that we do not see the whole wall at once:

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[63] Noë, *Action in Perception* pp. 223-24.
[64] Daniel C. Dennett, *Consciousness Explained*, 1st ed. (London: Penquin, 1991) pp. 354-55.

> It is certainly right that you don't notice a gap in the visual field corresponding to the blind spot, even under monocular viewing conditions. In general, if you shut one eye and stare at the wall with the other, you have a visual experience as of a gap-free expanse of wall. That is, it looks to you as if the is an unbroken expanse of wall. But this is not to say that it seems to you as if, as it were, in a single fixation, you experience *the whole of the wall's surface*. If you reflect on what it is like for you to look at the wall, you will notice that it seems to you as if the whole wall is there, at once, but not as if every part of the wall's surface is represented in your consciousness at once. Rather, you experience the wall as present, and you experience yourself as having access to the wall, by looking here, or there, by attending here, or there. It is no part of ordinary phenomenology that we experience the whole wall, every bit of it, all at once.[65]

It is clear from this passage that Noë believes that the content of perceptual experience is limited, that it does not *seem* to be rich, whereas Dennett's view is that it does seem to be rich in the sense that we ordinarily take the phenomenal content of perception to be rich. Noë states clearly that he takes this to be the only conclusion that can be drawn from the scientific work on perception:

> The upshot of the empirical work is that there is a sense in which you do not actually experience and monitor all the present detail. You do not really see it at all. The actual content of your experience – of your attentive seeing at a moment in time – is much narrower and much sparser.[66]

And what is more, Noë argues that one cannot even see the whole of the facing side of objects that one is looking at. I will come back to this claim later in this chapter, my aim for now being to show that Noë clearly maintains that the content of occurrent perceptual experience is both narrow in terms of content and sparse in detail. That is, we do not see all of the objects and details around us and those that we do are not experienced in complete detail.

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[65] Noë, *Action in Perception* p. 56.
[66] Noë, *Action in Perception* p. 192.

Another example of the way that visual experience is minimal is revealed by studies into the phenomena known as “change blindness”. These studies have revealed that we do not notice all of the details of, or even all of the things that are in the visual field (especially things that change between visual saccades.) Examples of this include the so called “mudsplash” experiments – in which an opaque splash blocks out part of the visual field for a split second during a viewing task – simple movies where objects are moved or replaced between editing or camera angle cuts, experiments where a person acting as a stranger asking a question is switched while other actors distract the person being asked the question with a prop of some kind and viewing tasks in which objects change colour without any interference.[67] Noë argues that, although change blindness does not necessarily show that we are not in possession of detailed internal representations, it does show that we do not make use of them – that is we do not access them in normal perceptual experience, we do not compare them against each other if they do exist – and that vision is largely attention-dependent.[68] This fact is further demonstrated by examples that exploit the fact that we are also subject to what is referred to as “inattentional blindness.” One example of this is sleight of hand magic, which depends upon this phenomena in order to work, as well as videos (such as those made by Neisser and colleagues as well as Simons and Chabris) in which a woman with an umbrella or a person in a gorilla suit can walk through the scene unnoticed while the viewer is engaged in a viewing task such as

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[67] For examples and discussion see: Noë, Thompson, and Pessoa, "Finding out Anout Filling-In.", J. O'Regan et al., "Picture Changes During Blinks: Looking without Seeing and Seeing without Looking," *Visual Cognition* 7, no. 1-3 (2000), J. O'Regan, Ronald A. Rensink, and James J. Clark, "Change-Blindness as a Result of "Mudsplashes."" *Nature Vol 398(6722) Mar 1999, 34* (1999), Ronald A. Rensink, J. O'Regan, and James J. Clark, "On the Failure to Detect Changes in Scenes across Brief Interruptions," *Visual Cognition* 7, no. 1-3 (2000), Brian J. Scholl and Daniel J. Simons, "Change Blindness, Gibson, and the Sensorimotor Theory of Vision," *Behavioral and Brain Sciences* 24, no. 05 (2002), David I. Shore and Raymond M. Klein, "The Effects of Scene Inversion on Change Blindness," *The Journal of General Psychology* 127, no. 1 (2000), Daniel J. Simons and Christopher F. Chabris, "Gorillas in Our Midst: Sustained Inattentional Blindness for Dynamic Events," *Perception Vol 28(9) 1999, 1059-1074* (1999), Shannon. Vallor, " An Enactive-Phenomenological Approach to Veridical Perception.," *Journal of Consciousness Studies* 13, no. 4 (2006.).

[68] Noë, *Action in Perception* p. 52.

counting the number of times that a group of people catch a ball.[69] Whether or not we have or make use of detailed internal representations, these phenomena show that we do not perceive all of the visual field all at once, which supports the minimalist claim that the content of perception is sparse and/or narrow.

It is clear that Noë, at least sometimes, develops and argues for a minimalist position in regards to perceptual content. As I have shown, Noë claims that we do not fill-in visual information to compensate for the region of the eye where there are no photo-receptors; that the related phenomena of change-blindness and inattentional-blindness show that we do not even see everything that is in our visual field; and that by paying close attention to the phenomenology of experience we realise that we do not see everything uniformly in focus and definition.

2.3 The Enactive Account of (Sensorimotor) Perceptual Richness

However, Noë and O'Regan claim that the enactive theory of perception can account for how and why it *seems* to us as if the content of perceptual experience is not as narrow and sparse as the above considerations on change/inattentional blindness etc. reveal it to be. That is, Noë and O'Regan claim that the enactive account is phenomenologically apt, that it can explain how and why perception *seems* to be rich.

The sensorimotor/enactive theory of perception is, to a large extent, an attempt to explain visual perception in light of the fact that our conscious visual experience *seems* to be rich, detailed and uniform when in fact we only perceive a limited amount of environmental detail. Noë and O'Regan argue that the reason why it seems to us the content of our visual perceptions is detailed and complete or uniform is because the

[69] For further discussion and examples (in addition to those mentioned in ft. 66, above) see: A. Mack and I. Rock, *Inattentional Blindness* (Cambridge, MA: MIT Press, 1998), U. Neisser and R. Becklen, "Selective Looking: Attending to Visually Specified Events," *Cognitive Psychology* 7 (1975), Daniel J. Simons, *The Visual Cognition Laboratory Home Page at the University of Illinois.* [Webpage] (The Visual Cognition Laboratory Home Page at the University of Illinois., 2003 [cited 2007]); available from http://viscog.beckman.uiuc.edu/djs_lab/demos.html.

world, which is the “storehouse” of the contents of perceptual experience, is present to us as a type of content which he calls “virtual content.” They argue that if the content of visual perception is construed as virtual content then it is possible to understand the phenomenology of perception without needing to posit or accept that such content is constituted by mental representations or processes in the brain such as “filling-in”.

Virtual content seems to me to be a kind of virtual representation of the perceptual information that we have access to. Noë uses the internet as an analogy for the way that he thinks that this kind of information is present. By using the internet we can view the information that is stored on another computer as if it were stored in our own. The information seems as if it is stored on our computer because it is accessed in the same way and speed as accessing the information that actually is stored in our own computer. In the case of visual perception in particular, it seems to us that we are seeing everything in high detail all at once because we can focus on the detail– that is we can access to the detail – so quickly that it seems to us as if we have been seeing that detail all at once:

> To experience detail virtually, you don’t *need* to have the detail in your head. All you need is quick and easy access to the relevant detail when you need it. Just as you don’t need to download, say, the entire *New York Times* to be able to read it on your desktop, so you don’t need to construct a representation of all the detail of the scene in front of you to have a sense of its detailed presence.[70]

By using this analogy Noë is arguing that, even though the entire newspaper is not stored on your hard drive, we can access the different parts of the newspaper by performing certain actions that are the similar or identical as if it were; for example, by pointing the curser and clicking on the relevant part of the screen in the same way that you would if it were stored on your hard drive. That is, the newspaper is “virtually present” on your computer. Similarly we have access to visual detail by performing certain actions according to Noë. In the case of the internet, we know how the

[70] Noë, *Action in Perception* p. 50.

computer and internet operate, which just is our practical knowledge of how to access different parts of the "online" newspaper. In the case of perception Noë argues that we have access to visual detail because we have knowledge of sensorimotor contingencies. That is we know how to use our sensory apparatus, our eyes, to modulate stimulus and *access* information.

Although it is not clear what we have access to in the case of vision. In the internet example we have an awareness that we can access other pages of the Newspaper, but how can we know what we can access with our eyes, if, we cannot see more than a limited amount of the visual field? If I am looking at a picture that I have not seen before, or walking down a street that I have never been down before, how can it be said that I know how to access details that I have never encountered before?

Noë responds to this problem by arguing that perception is a temporally extended activity. Noë argues that the sceptical line of reasoning – the "Grand Illusion" hypothesis – is based on a bad inference from a single visual fixation to the character of vision itself. Noë points out that the fact the one can not see colours in peripheral vision does not mean that colours are not available, but we do not take ourselves to have access to all of the available detail in a single fixation.[71]However, due to the temporally extended nature of perception we do, according to Noë, have access to the sort of rich and detailed perceptual experience of the world that we seem to:

> Of course it *does* seem to us as if we have perceptual access to a world that is richly detailed, complete, and gap-free. And indeed we do! We take ourselves to be confronted with and embedded in a high-resolution environment. We take ourselves to have access to that detail, not all at once, but thanks to movements of our eyes and head and shifts of attention.[72]

Noë believes that it is correct to think about vision in this way because on reflection we do take ourselves to have access to the whole visual field, but not all at once. We may

[71] Noë, *Action in Perception* pp. 56-57.
[72] Noë, *Action in Perception* p. 57.

be surprised by the results of change-blindness studies, but this is only because we generally take ourselves to be better at noticing changes than we are. But on the other hand, we are not surprised by the fact that we have to move our eyes and heads etc. to gain access to environmental detail *because* we do not naturally assume that vision is "snapshot-like" and that we have all of this detail in our heads. We know that in order to see a part of a wall that is to the left of the current focal point involves certain movements and the use of our sensory apparatus rather than the use of internal or retinal images.

According to the enactive theory, we experience a sense of the awareness of detail because we know how to access it, not because we possess images or representations of it or know what it is in some other way. But does this really account for how we, in some sense, know what detail we have access to? Noë and O'Regan argue that we are not surprised that we have to move our eyes to focus on detail and that change and inattentional blindness studies do not surprise us because we are aware that our perceptual experience can be inaccurate. But there is a sense of surprise on the part of participants in change/inattentional blindness experiments that reveals that we do ordinarily take ourselves to *know* what is before our eyes because we believe that we can and do see what is in front of and around us. Dennett points out that when the effects of change/ inattentional blindness are pointed out to someone the surprise or shock that is experienced reveals that the person expected something else, they expected to see everything in front of them, even though they have no right to hold these expectations.[73] I know that I was surprised when I first saw the "Gorilla" video, that I did not see the gorilla walk through the scene. I really did think that I would see something so obvious. We do ordinarily assume that we would notice changes, such as objects changing colour, that happen right in front of us. Sleight of Hand magic tricks work only because we ordinarily work on the assumption that we should be able to see how the magician pulls off the trick. We are *surprised* that we do not see how the

[73] Dennett, "Surprise, Surprise," p. 982.

magician performs the trick. That is what makes magic tricks entertaining. Noë claims that this surprise is plausibly:

> explained by supposing that we tend to think that we are better at noticing changes than we in fact are, or that we are much less vulnerable to the effects of distracted attention then we in fact are.[74]

This is, plausibly, at least part of the explanation but it does not address the fact that one is surprised that they did not see something or that something changed colour. This can only be because one expects that they would see such things. That is, it seems to us that we would perceive such changes. If we are surprised that something changes from red to green right in front of our eyes it is because it *seems* like we should see it. How can we be surprised that something has changed colour if we do not know that the thing which now appears green previously appeared to be red? Equally plausible is the possibility that we are surprised *when* we see that something has changed colour because we have formed an expectation that something will be a certain colour because we *saw* that it was that colour. We are surprised *that* we see it, that we *see* that it is now a different colour. Noë and O'Regan cannot account for the fact that when we see that something has changed it is because we compare what we are seeing to what we have seen because he rules out the possibility of any sort of mechanism for comparison, and they do not explain how such comparisons are possible.[75] Therefore, on this basis, our knowledge of sensorimotor contingencies could only be applied only to occurrent sensory stimulation and perceptual experience.

Noë argues that we can explain this sense of surprise if perception is understood as a temporally extended activity. Perception is, according to Noë and O'Regan, the process of using our knowledge of sensorimotor contingencies to "navigate" the rich and detailed perceptual information that we have access to. According to Noë we think that we see all of the details of the perceptual field because

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[74] Noë, *Action in Perception* p. 58.

[75] O'Regan and Noë, "A Sensorimotor Account of Vision and Visual Consciousness," p. 1018, Scholl and Simons, "Change Blindness, Gibson, and the Sensorimotor Theory of Vision," pp. 1004-06, Benjamin W. Tatler, "Re-Presenting the Case for Representation," *Behavioral and Brain Sciences* 24, no. 05 (2002): pp. 1006-07.

the details of the perceptual field are presented to us during the course of perceptual experience thanks to our perceptual access to it:

> [Occluded objects and] the detailed scene, all are present perceptually in the sense that they are perceptually accessible to us. They are present to perception as accessible. They are, in this sense, *virtually* present.
>
> The ground of this accessibility is our possession of sensorimotor skills. In particular, the basis of the perceptual presence [of environmental information] is to be found in those skills whose possession is constitutive, in the ways I have been proposing, of sensory perception.[76]

If perception is constituted by knowledge of sensorimotor contingencies, then we can have rich and detailed perceptual experiences if we have knowledge of a rich set of sensorimotor contingencies. And Noë and O'Regan suggest that we do:

> Having the feeling of seeing a stationary object consists in the knowledge that if you were to move your eye slightly leftwards, the object would shift one way on your retina, but if you were to move your eye rightwards, the object would shift the other way. The knowledge of all such potential movements and their results *constitute* the perception of stationarity [sic].[77]

We have quick and easy access to visual detail because it only takes a "flick-of-the-eye" to focus on the relevant detail. The only way we could accomplish this and have the experience of a rich and detailed environment is if we typically have knowledge of a rich set of sensorimotor contingencies such as those required to view a stationary object. This shows that Noë and O'Regan are committed to the Sensorimotor Richness Thesis, which allows us to have access to and be aware of such detail as virtual content. This quick and easy access is what accounts for the subjective experience of rich and detailed visual experience. Having knowledge of a rich set of

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[76] Noë, *Action in Perception* p. 63.
[77] O'Regan and Noë, "A Sensorimotor Account of Vision and Visual Consciousness," p. 949.

sensorimotor contingencies therefore *enacts* perceptual experiences which are constituted by such knowledge (Constitution Thesis).

And yet, they also maintain that in any given moment the actual occurrent perceptual content is extremely limited in detail (and thus, committed to the Perceptual Minimalism Thesis). Given that, according to the Constitution Thesis, perceptual experience is constituted by our knowledge of sensorimotor contingencies, and nothing more, then it is unclear how it is that we can at once both experience a rich and detailed environment (as virtual content) and yet not *really* experience very much of it at all.

2.4 Resolving the Inconsistency

The very name of Noë's proposed form or type of content, "virtual content", at least suggests that there is, possibly even in Noë's mind, a distinction between virtual content and non-virtual content; what we might casually refer to as "actual" or "real" content. As can be seen in some of the passages I have quoted so far Noë does seem to indicate that there is a distinction between actual content and virtual content, but he is never clear on what it is. Solving the inconsistent triad requires a clear distinction between the two; and then, using this distinction to distinguish what is meant by "content" in the last two theses (the Minimalism and the Sensorimotor Richness). Any proposed solution (even if it involves elements that are not found within the enactive account of perception) cannot undermine the Constitution Thesis as that would negate the central claim of Noë and O'Regan's enactive/sensorimotor account of perceptual experience. In the rest of this chapter I will discuss different proposals that could be put forward to make this distinction and solve the inconsistency.

One way that you could propose to do this is to allow some form of mental representation to play a role in the perceptual process:

Representational Proposal: *Real content involves representation, whereas virtual content involves only sensorimotor contingencies*.

The form of representation involved need not be a sort of "pictorial" or snapshot like image, which Noë would find abhorrent; it could perhaps be some sort of neural-encoding of the features of the environment that one is attending to such as, size, shape, colour, spatial location etc. This may be construed as one or more representations stored in a "working-memory" system that consist of a knowledge base of the features that are currently accessible by perceptual activity.[78] In this case, virtual content would be a virtual representation of the features of the environment that one is not presently accessing. So even though you have a vague sort of awareness that some feature of the environment is out there (which requires an explanation as to how), it is not real content in that you are not currently receiving sensory stimulation from those features and so it is not surprising that you do not notice if things move or change colour or whatever. This leads to a re-formulation of two of the theses:

Perceptual Minimalism Thesis: *The contents of occurrent, perceptual experience are less rich than we ordinarily take them to be*.

Sensorimotor Richness Thesis: *Perceptual experience (as virtual content, virtual representation) seems rich because we typically have knowledge of a rich set of sensorimotor contingencies*.

Now these *sound* like things that Noë and O'Regan *might* say; they often say things to much the same effect, and they do not ask us to believe that the brain plays no role in perceptual experience whatsoever. Although they never really go into what role the brain does play, they do run with the general assumption that it is involved in some way. This proposal does of course call for an explanation of what these

[78] I will discuss this possibility in chapter 4.

representations are and what role they play. I will return to how such an explanation can work in chapter 4 of this thesis.

However Noë is vehemently anti-representational. Although he acknowledges that change-blindness studies do not show that we do not have representational content he argues that it does show that if we have them we do not actually use them in normal perceptual experience – we do not compare them or refer to them in any way. Also, Noë argues that content is "virtual all the way in," so by appealing to another type of content, representational content, suggests that there is something wrong with the constitution thesis, that there is something other than knowledge of sensorimotor contingencies that is constitutive of perceptual experience. And paradoxically, non-real/occurrent (or virtual) content seems, in a sense, to be just as rich as real content, if not more so.

Another way that you could propose to distinguish between real and virtual content is by proposing that:

Access Distinction Proposal: *The distinction between virtual content and real content is the distinction between accessible and accessed content.*

The proposal here is that real content is the content that you are currently accessing, whereas virtual content is what you have access to but are not currently accessing. In other words, real content is what you are focussing on and virtual content is what you are not focussing on. Merleau-Ponty distinguishes between the figure and the background in a similar sort of distinction.[79] This proposal leads to a reformulation of the second two theses in this way:

Perceptual Minimalism Thesis: *The content of non-virtual perceptual experience is less rich than we ordinarily take it to be. (That is, we do not access all detail all at once)*.

[79] Maurice Merleau-Ponty, *Phenomenology of Perception*, trans. Colin Smith (London: Routledge, 1962) pp. 235-36ff.

> Sensorimotor Richness Thesis: *Perceptual experience (as virtual content) seems rich because we typically have knowledge of a rich set of sensorimotor contingencies related to the non-accessed but accessible field of perceptual experience*.

This proposal also fails to solve the inconsistent triad because, according to the enactive theory, we have the same perceptual relationship to accessed perceptual information as we do to accessible perceptual information (as virtual content), so these two theses end up being conflated. This is not so much of a problem for Noë, who claims that perception is virtual "all the way in." Unlike the computer/internet analogy above there is no sense in which there is any perceptual data stored in the brain as there is on one's computer according to Noë. Noë claims that there is no distinction that can be drawn between what information is accessed and which is accessible:

> experiential presence is virtual *all the way in*. Experience is fractal and dense. Wherever you look in your visual field, at whatever scale you select, you are always given a whole field that contains elements that are focal, and elements that are peripheral, elements that are surveyable, and elements that are hidden. When you peel away the layers of potentiality and merely virtual presence, you are not left with pure phenomenological content, that which, as it were, is present to your mind now. You are presented with qualities that in turn have qualities and that are presented against a structured background.
>
> This is an important disanology with the computer case. [Consider looking at a tomato]. You see the facing side. You can't see the far side, but you have a perceptual sense of its presence thanks to your practical grasp of sensorimotor patterns mediating your relation to it. The rear side is present virtually, but the facing side is simply present. Notice, however, that you do not, as a matter of fact, have the *whole* of the facing side of the tomato in consciousness all at once. The facing side has extent and shape and

> colour, and you can't embrace all this detail in consciousness at once, any more than you can embrace the whole detailed scene. Take a tomato out. Look at it. Yes, you have a sense that the facing side of the tomato is all there, all at once. But if you are careful you will admit that you don't actually experience every part even of its visible surface all at once. Your eyes scan the surface, and you direct your attention to this or that…
>
> …What this shows, as stated, is that you cannot factor experience into an occurrent and a merely potential part. Pick any candidate for the occurrent factor. Now consider it. It too is structured; it too has hidden facets or aspects. It is present only in potential.
>
> Qualities are available in experience as possibilities, as potentialities, but not as completed givens. Experience is a dynamic process of navigating the pathways of these possibilities. Experience depends on the skills needed to make one's way.[80]

So for Noë, conflating these theses is not problematic. But it is a problem if, like me, you think there is some sort of distinction between that which is currently being accessed and the merely accessible, that is, between actual and virtual content. According to Noë we have no reason to believe that real content is any more detailed than virtual content ("you cannot factor experience into an occurrent and a merely potential part") and so it again seems that, paradoxically, one sort of content is as rich as the other. But, as Noë states, if we really concentrate on what we actually perceive in any single visual fixation we notice that there is a big difference between what we actually see at any one time and what we may take ourselves to be able to see. So either there is a distinction between "occurrent and merely potential" content, or knowledge of sensorimotor contingencies constitutes perceptual experience richer than the way Noë describes it above. By conflating the Minimalism Thesis and the Sensorimotor Richness Thesis; the Representational and Access Distinction Proposals suggest that the Constitutional Thesis is incomplete or is incorrect, as there must be

[80] Noë, *Action in Perception* pp. 216-17.

some other process or mechanism involved (other than knowledge of sensorimotor contingencies) in separating or distinguishing non-virtual from virtual content. Therefore these proposals would not acceptable to Noë and O'Regan as they currently stand.

But I think that there is something to the Representational Proposal and the Access Distinction Proposal. Noë makes no bones of the fact that he takes the enactive thesis to be largely inspired by the work of Merleau-Ponty and although he never actually draws any comparisons between his account of content and Merleau-Ponty's figure/background distinction I can only assume that he is aware of it and would be happy to use the distinction in some way. But if we cannot use this distinction to solve the inconsistent triad by reformulating the second two theses (Minimalism and Sensorimotor Richness) then perhaps we can use it to re-formulate the first, constitutional, thesis of Noë's inconsistent triad.

2.5 Modification of the Constitution Thesis – Two Types of Content

The Access Distinction proposal lends itself to two proposals for modifying the Constitution Thesis. The first proposal for modification of the constitutive thesis involves bringing in a "know-that" constraint on perceptual content. So then the constitutive thesis would have to be expanded to explain that not only is perceptual content constituted by the know-how which provides access to this content but also by the knowledge that we have access to such content. In one of the earliest presentations of the enactive thesis Noë and O'Regan suggest that a form of "know-that" type of knowledge does play a role in perceptual experience. This is illustrated by the example they use of the game of guessing what a hidden object is that I discussed in chapter 1. In this example, the person playing this game at first "senses" various parts/aspects of the object. It seems that one only *perceives* the object once one had recognised it. When one has recognised it one can then use their sensorimotor knowledge/skills to exert some control over the object and the sensory stimulation one receives from it. Even though you only receive sensory data from certain parts of your finger, you have a

sense of richer content than this because you also know how to access it. That is you know *that* you can access it, you form an expectation of what you can access, based on what your knowledge of sensorimotor contingencies and your knowledge of factual details of particular objects, which is based on the object's size, shape and type of object. So knowledge of sensorimotor contingencies constitutes both non-virtual (accessed) and virtual (accessible) content.

This proposal then, seems like something that Noë might accept, and crucially it ticks all of the boxes in terms of remaining within the bounds of the enactive/constitutive thesis as well as the other two theses – it provides a way for all three positions to co-exist.

The second proposal for modifying the constitutive thesis involves bringing in a distinction between *having* know-how and *using* it. For example, I currently know how to ride a bike, even though I am not currently riding one. I also know how to access my memory of what I did last Thursday, even though I am not currently accessing or using that memory. Noë and O'Regan often state that perception involves one exercising their mastery of sensorimotor laws[81] and also suggest that they have a similar constraint in mind when they state that according to their approach:

> [A] person (or system or machine) is perceptually aware of something if the system makes use of perceptual information about the thing for the purpose of planning, rational thought or linguistic behavior.[82]

According to Noë and O'Regan this form of awareness corresponds to Block's definition of "access-consciousness."[83] In regards to perceptual content what this means is that we draw a distinction between, e.g., the periphery of the visual field,

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[81] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," p. 82, see also pp. 83-84, 85, 88.
[82] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," p. 94.
[83] Ned Block, "On a Confusion About a Function of Consciousness," in *The Nature of Consciousness*, ed. Ned Block, O. Flanagan, and Guven Guzeldere (Cambridge, MA.: MIT Press, 1997).

which we may know how to access but are not currently doing so, and the focal point of our visual field which we are currently accessing. It also allows for a distinction between the objects or features (of the world) that we are perceptually aware of, or making use of. Perceptual experience then, could be said to be the activity of keeping track of these features for as long as we are using the know-how to access these features during perceptual activity. This is also an acceptable proposal because it also allows for a distinction between the Minimalist and Sensorimotor Richness theses while remaining within the bounds of the enactive thesis.

I suggest that we can solve the inconsistency if we put these proposals together to modify the Constitution thesis in this way:

> Constitution thesis: *Perceptual (visual) experience is constituted by the appropriate use of knowledge of sensorimotor contingencies*.

This modification allows the enactive thesis to describe how perceptual content is constituted by knowledge of sensorimotor contingencies and provides the benefit of putting useful and explanatorily necessary constraints on what the content of perceptual experience is by constraining what content our knowledge of sensorimotor contingencies provides access to. It also allows the enactive thesis to explain the nature of occurrent (non-virtual, actual, real) perceptual content which is less rich than we take them to be (Minimalist Thesis) as well as to provide an account of why it seems that we experience a rich and detailed environment because we typically do have knowledge of a rich set of sensorimotor contingencies, and, if used appropriately we can use this knowledge to access the detail in the environment. Or rather, if a particular object or aspect is currently important to us, then the appropriate sensorimotor skill/s are “at-the-ready”, thus providing the feeling that we have constant access or awareness of it because it takes such a short time to execute the appropriate skills or actions in the domain of visual perception.

This solution is also one that fits with the enactive account of perceptual experience, with some modifications, and perhaps be something that Noë and O'Regan may find acceptable. One modification that I suggest needs to made, which Noë and O'Regan would find hardest to accept, is that it must be accepted that there is a limited amount of information that is stored in some way and used in perceptual activity. Although Noë and O'Regan denounce mental representation, they do concede that there is some mechanism of information storage:

> We agree that the visual system stores information from moment to moment, and to some extent from saccade to saccade, and this is what is used to evaluate changes.[84]

Noë and O'Regan also claim that perceptual awareness involves using perceptual information for planning, rational thought and linguistic behaviour.[85] I cannot think of any way to understand this claim other than by allowing that perceptual information is available to thoughts or mental states that are, broadly speaking, representational. That is, plans, rational thoughts and elements of speech involve representing the world as being one way or another. Using perceptual information in these processes is simply exercising the ability to access this information as required for planning, rational thought, and linguistic behaviour. As I said earlier, I will return to how this is possible in chapter 4 of this thesis.

Noë also has to accept that there is a distinction between occurrent and merely potential experience. There is a phenomenological difference between perceptual experience that is presently encountered and that which it is possible to encounter. This, I have argued, is the difference between perceptual information that is currently accessed and that which is accessible. The simplest way to make this distinction is to call occurrent perceptual experience that which directly involves sensory stimulation and potential perceptual experience as that which does not. In this case, I have argued, potential perceptual experience equates to Noë's account of virtual content while

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[84] Kevin O'Regan and Alva Noë, "Authors' Response: Acting out Our Sensory Experience," *Behavioral and Brain Sciences* 24, no. 5 (2001b): p. 1018.
[85] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," p. 94.

occurrent perceptual experience is non-virtual. Although having said that, I will show in chapter 4 that there is something wrongheaded about the way Noë puts forward the notion of virtual content.

I also believe that Noë also needs to accept that what we experience as occurrent perceptual experience is perhaps broader than he often suggests. Although any “occurrent factor” of perceptual experience may be too structured to be captured completely by perceptual experience, there is some “factor”, however limited it may be. And, those factors that are not occurrent factors are *available* to perceptual experience and are in some sense present to perceptual experience as “virtual content”. By making a distinction between occurrent and non-occurrent perceptual content, or accessed and accessible content, the enactive approach to experience can provide an acceptable account of perceptual content that describes and explains perceptual experience as the activity of accessing available perceptual content. With these modifications the enactive approach can explain the phenomena of change and inattentional blindness on the grounds that such perceptual anomalies pertain to environmental features that are not involved in the planning, rational thought or linguistic activities of the perceiver and are therefore not available to perceptual experience. Or perhaps, rather, such features are not the focus of perceptual experience. These modifications also allow the enactive approach to explain why it we commonly take ourselves to have rich and detailed perceptual experiences on the grounds that we have perceptual access (as “virtual content”) to environmental features that are relevant to our perceptual exploration of the environment for the purposes of planning, rational thought and linguistic activities.

3 The Reach of The Enactive Approach

> For it is an open question, an empirical question, whether the content and character of the sorts of perceptual experiences we actually enjoy are controlled by our sensorimotor expectations *alone*.[86]

3.1 Introduction – The Reach of the Enactive Approach

The enactive, or sensorimotor-contingency, approach to perception is put forward as an account of all perceptual activity. For the most part however, it is primarily vision and – to a lesser extent - touch that are used as examples of how this thesis applies to perceptual activity. This *ocular-centrism* is not exclusive to Noë and O'Regan's account of perceptual experience, it is a common feature of many accounts of perception. Any account of perceptual experience, if it claims to be an account of all perceptual experience, ought to demonstrate how it applies to all perceptual modalities – especially if the theorist/s choose to select one perceptual modality as paradigmatic for understanding perceptual experience. In this chapter I will discuss whether or not an enactive approach to perception is a plausible approach to understanding some of the other perceptual modalities.

Firstly, I will allow Noë and O'Regan to speak for themselves. I will quote the few passages where they do mention the other perceptual modalities. As will be obvious, these few remarks do not amount to a satisfying account of how the enactive approach applies to these modalities. Noë takes it for granted that his enactive account

[86] Alva Noë, "Experience without the Head," in *Perceptual Experience*, ed. Tamar Szabó Gendler and John Hawthorne (Oxford: Oxford University Press, 2006), p. 429. Emphasis in the original.

of colour perception can be extended to the other modalities. On this basis it makes obvious sense to examine his and O'Regan's account of colour perception in depth to determine what they think an enactive account of other perceptible qualities will *look* like. In order to come to terms with the issues that any account of perception faces in explaining these modalities I will discuss empirical evidence concerning some of these modalities and the explanations that this evidence suggests. This will serve two purposes. Firstly it will raise certain aspects of sensory/perceptual systems that any account of perception must be able to accommodate and secondly it will also show that many common assumptions (such as simply neural encoding) in theories of perception must be ruled out, opening the way for alternative approaches such as the enactive approach. Then I will discuss how an enactivist might, or ought to, respond to these challenges and how these discoveries should be incorporated into the enactive approach as a whole to develop a more robust, plausible and satisfying approach to understanding perceptual experience.

3.2 Fragments from Noë and O'Regan

In this section I will relate what Noë and O'Regan have to say with regards to perceptual modalities other than vision and touch. Of the few things that they do say, most are more concerned with similarities and differences between the modalities, which does not reveal any great insight into how they believe the enactive approach actually applies to them. But hopefully it will provide a very rough guide to how the enactive approach might proceed in their opinion.

In terms of distinguishing perceptual modalities they tend to describe the differences in terms of other skilful activities:

> our proposal has the advantage of providing an account of what differentiates the sensory modalities. The problem is solved naturally, without appealing to the existence of sensory-modality-specific essences or mechanisms. Just as horse riding is different from motorcycling, so is

> seeing different from hearing. These differences can be explained without appeal to the essences of horseback riding and motorcycle riding, and without appeal to the specific nerve energies or pathways devoted to seeing and hearing. The difference between seeing and hearing is to be explained in terms of the different things that we do when we see and hear.[87]

In this passage it is clear that they take the difference between seeing and hearing to be a matter of the "different things that we do when we see and hear". But what exactly does this tell us? If all we are meant to take from this is that when we see we use our eyes to focus on parts of the environment and when we hear we use our ears to focus on sounds then it is hard to argue with them but it is not clear that we have learnt anything at all. I mean, do they think that anyone assumes we do the same thing when we see and when we hear? What should we make of their analogy here to riding horses and motorcycles? In both cases one assumes a similar body position on the conveyance, one takes the steering mechanism in their hands, one tries to balance as best they can, one travels forward much faster than backwards, one can turn their heads to notice features of the environment that may or may not be relevant to getting to their destination, and so on. And of course there are many differences; whipping and coaxing the horse rather than twisting the throttle, differences in balance techniques and so on. So what do we make of this? Are seeing and hearing essentially the same or not? The only thing we can be sure of is that seeing and hearing, on an enactive account, are different skills but it is unclear from this example whether or not these skills share anything in common or not.

In a similar vein Noë and O'Regan argue that the difference between seeing (a red flower) and smelling (a red flower) is analogous to the difference between driving a Porsche and driving a tank:

> Just as the difference between driving a Porsche and driving a tank consists in the different things you do in driving it – that is, in the different

[87] O'Regan and Noë, "A Sensorimotor Account of Vision and Visual Consciousness," p. 971.

> skill-based understanding of how to drive a vehicle, - so the difference between seeing a red flower and smelling a red flower consists in the different patterns of sensorimotor contingency governing one's perceptual encounter in each situation. To see a red object, or the feel of driving a Porsche, is to know, for example, that if you change the illumination in such and such ways (or press down on the accelerator in such and such ways), it will produce such and such changes in stimulation.[88]

Noë and O'Regan compare seeing red with driving a Porsche both in the BBS paper and in *What it is Like to See*. In this way they try to make the point that there is no qualia or other type of representation that constitutes either experience, each experience being constituted by the sensorimotor skills deployed in these experiences. In this case the analogy makes sense if one is inclined to agree that perceptual experience is non-representational. However it is not clear how describing the difference between seeing and smelling as like the difference between driving a Porsche and driving a tank is particularly illuminating. As with the difference between seeing and hearing above it simply amounts to the truism that both are similar in so far as both experiences are perceptual, but differ in so far as they are different types of perceptual experience. Although there are obviously differences between driving a tank and a Porsche the skills involved are very similar and perhaps even identical in some ways. It would make more sense if Noë and O'Regan said that the difference between driving a tank and a Porsche is analogous to seeing red or seeing green. That is, two activities that involve essentially the same skilful engagement with the world that produce qualitatively different types of experience in the same modality. But they do not, and so it remains unclear how we are supposed to see how the enactive approach accounts for olfactory experience from this analogy.

It is clear that there is some confusion with regards to the inter-modality of sensorimotor skills when one compares some of the things they say on this matter. From the fact that subjects in experiments involving visual scene inversion can adapt to

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[88] O'Regan and Noë, "A Sensorimotor Account of Vision and Visual Consciousness," p. 961.

navigating and orienting themselves in the environment and yet be unable to read on account of the fact that letters have not “corrected” themselves (or rather, that the subject has not adapted to reading with the inverting glasses on) they say that:

> An observer adapting to an inverted world will in the course of adaptation only be able to progressively probe subsets of the sensorimotor contingencies that characterize his or her new visual world; and so inconsistencies and contradictions may easily arise between “islands” of visuo-motor behavior.[89]

This statement reveals that Noë and O’Regan take it to be the case that there are distinctions that can be made between different types of sensorimotor skills within the one perceptual modality. But then on the very same page they also state that:

> The impression we have of seeing a coherent world thus arises through the knitting together of a number of separate sensory and sensory-motor components, making use of visual, vestibular, tactile, and proprioceptive information; and in which different behaviors (e.g., reading, grasping, bicycle riding) constitute components that adapt independently, but each contribute to the experience of seeing.[90]

So on the one hand some sensorimotor skills are quite specific/ within a modality and on the other hand some (global) skills draw on sensory information from several sensory modalities. And yet, they also claim that closing one’s eyes “has no effect in the auditory or tactile modalities.”[91] The McGurk effect (which I will discuss further below) shows this last statement to be completely false as, in this case at least, opening and closing the eyes has a distinct effect on the nature of the auditory experience. The enactivist would be within their rights to respond that in these sorts of cases the sensory apparatuses involved is determined by the nature of the skill that the organism in engaged in. Certainly there is no reason to disagree that there is, in principle, sensorimotor skills that are inter-modal, but, there is also no reason to

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[89] J. Kevin O'Regan and Alva Noë, "A Sensorimotor Account of Vision and Visual Consciousness," *Behavioral and Brain Sciences* 24, no. 05 (2001): p. 953.
[90] O'Regan and Noë, "A Sensorimotor Account of Vision and Visual Consciousness," p. 953.
[91] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," p. 83.

suggest that all sensorimotor skills are inter-modal. And if we are to take seriously the notion that the brain is not directly responsible (in some sense at least) for determining what sensory stimulation is to be incorporated in the deployment of sensorimotor skill then we have ask how such diverse types of sensory stimulation are incorporated into the qualitative conscious experience that we take to be experienced through one modality. That is, why does vision have a qualitative visual “feel” to it when our visual experience makes use of vestibular, tactile, and proprioceptive information; why does it not “feel” like we are touching an object when we see it?

In detailing how the different modalities are differentiated, there is one point that they make clearly:

> It is a very important aspect of our approach to sensation that we claim that what determines the particular, visual, tactile, auditory, olfactory, etc. nature of a stimulation is nothing directly to do with the sensory pathways or brain areas which carry the nervous influx. Rather, what determines the experienced sensory modality of a stimulation are the sensorimotor laws governing that stimulation.[92]

This is a clear statement of one of the key features of the enactive approach. What it tells us with regard to the other senses is that whatever else we may say of them, from an enactive point of view, we cannot say that the perceptual experience is primarily constituted by the aspects of the nervous system that respond to or are involved in the processing of sensory stimulation. In other words, in order to count as an enactive description of the perceptual modality the description must primarily be in terms of the sensorimotor relations between the organism and the stimulus. Note, that they are careful not to say that the nervous system plays no role whatsoever in perceptual experience, but only that the nervous system is not directly responsible for determining the nature of the stimulation. Elsewhere they state that:

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[92] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," p. 87.

> It is not part of our view to deny that the brain is not (in some sense at least) the seat of our knowledge of sensorimotor contingencies.[93]

Noë and O'Regan are always careful to avoid being labeled "dualists" by accepting that the brain is involved in our conscious perceptual experience through similar statements. For example:

> Brain processes *participate* in seeing, but none deserves to be thought of as "the locus of seeing in the brain". Seeing is something we do, not something that happens in our brains (even though, of course, a lot goes on in the brain when we see).[94]

But if we take such statements on face value it is hard to avoid the suspicion that our mastery of sensorimotor contingencies involves a type of brain state that one might be tempted to describe as a type of representation. One of the questions that I will address in this chapter is whether or not there is reason to suggest that certain aspects of brain states and sensory pathways are directly involved in the qualitative aspect of perceptual experience. If it turns out that there is evidence of this, then we must conclude that the role played by our mastery of sensorimotor contingencies is overstated by Noë and O'Regan.

Another issue upon which they are clear is with regards to the distinction introduced by Block between access and phenomenal consciousness.[95] Noë and O'Regan reject the notion that one has perceptual experience of sensory stimulation that Block describes one as being access-conscious of without being phenomenal-conscious of it, and vice versa.[96] They reject the idea that Block's distinction applies to perceptual experience. Their reasoning behind this rejection is that; a: that if one is not phenomenally conscious of something then it does not make sense to say that one is

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[93] O'Regan and Noë, "A Sensorimotor Account of Vision and Visual Consciousness," p. 1016.
[94] Noë and O'Regan, "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience," p. 80.
[95] Block, "On a Confusion About a Function of Consciousness."
[96] O'Regan and Noë, "A Sensorimotor Account of Vision and Visual Consciousness," p. 964.

perceiving it, and; b: if one is not accessing that perceptual/phenomenological information then one is not using their abilities to track or monitor this sensory stimulation, therefore one is not perceiving it. For example, “background” noises do not count as cases of perception as one is not actively monitoring changes in the background noise. This conclusion is one that follows naturally from the enactivist argument that to perceptually experience something one must both be engaged with and understand the effects that movement will have on sensory stimulation. The importance of this point is that when considering perceptual experience in other modalities, only those types of experience that fit this definition of perceptual experience will be acceptable in terms of the enactive approach. Therefore sensory stimulation such as background noises cannot be considered.[97]

3.3 The Enactive Approach and Colour Perception

> This [enactive] account of colour and colour experience can be extended to other qualities perceptible in other sensory modalities.[98]

In this section it is not my aim to explicitly demonstrate and analyse whether or not the enactive approach is a satisfying account of how we visually perceive colour. My aim here is to discuss the enactive account of colour in light of the above statement from Noë to investigate whether or not there is anything specifically related to the enactive account of colour experience that can be used as a paradigm for how the enactive approach applies to other sensory modalities as Noë states that it can be.[99] Naturally, what Noë and others have to say with regards to colour is an extension of the enactive account of visual experience in general. Here, I will simply point out the ways in which these claims map onto the peculiarities of colour experience/perception rather

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[97] Noë and O’Regan are not arguing that one is not sensitive to such sensory stimulation, but that mere sensitivity does not amount to perceptual experience unless that stimulation is being attended to and plays a role in one’s ongoing active engagement with the environment.
[98] Noë, *Action in Perception* p. 160.
[99] Noë, *Action in Perception* in section 4.10 "Sounds and Other Qualities:The Account Extended" pp.160-61.

than the perception of shape or size etc. Although colour and coloured things are often used as examples in describing visual experience it is in Chapter 4 of Noë's *Action in Perception* and in research conducted by O'Regan and Bompas[100] that specifically address the experience of colour as a sub-set of visual experience. I base what follows on these texts.

As the experience of colour is a visual phenomenon it comes as no surprise that the enactive account of colour experience is practically the same as the enactive account of vision. Specifically, Noë argues that the way in which we perceive colours is similar to the way that we perceive shapes. Briefly, Noë argues that when we see an object such as a plate we see that it is a round thing even though it may *look* to be elliptical due to the perspective from which one is looking at it. In other words, a round object when viewed from an angle *occludes* a certain area of the visual field, an elliptical area. Such properties of objects are referred to by Noë as the "perspectival properties" (or "P-properties").[101] Perspectival properties are the apparent size and shape of an object as viewed from a particular perspective. These properties change as the perceiver or the object move within the visual field. According to the enactive approach we perceive that an object is a certain size and shape, e.g. round, by understanding how these perspectival properties change as a result of movement. Or to put it another way, we see that an object is a certain size and shape by understanding how sensory stimulation (i.e. perspectival properties) is affected by sensorimotor contingencies.

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[100] Aline Bompas and J. O'Regan, "Evidence for a Role of Action in Colour Perception," *Perception* 35, no. 1 (2006). In this paper O'Regan and Bompas report on particular experiments. Essentially there are only a couple of interesting points to raise. Their experiments show that by using a training routine to adapt subjects to coloured lenses they have shown that it is possible to effect colour perception if they are forced to moved their eyes from right to left, or vice versa, which, they argue, provides empirical evidence that sensorimotor contingencies play a role in the phenomenology of colour experience. Essentially all they have done is reproduced the same effect that Albers – mentioned below (ft. 100) – did with coloured strips of paper, but in this case the foreground and background colours do not change but rather the colour of the lens through which they receive sensory stimulation from grey-coloured patches.

[101] Noë, *Action in Perception* p. 83.

Just as the apparent size and shape of an object varies according to the relation between it and the perceiver so too (it is argued) does the (apparent) colour. In the case of colour, however, the there are other factors related to the source and type of lighting/illumination that play a crucial role. These factors include:

- The type of light source: objects appear to be slightly different in colour when viewed in (bright, midday) sunlight or darkness, or when lit by household lights, fluorescent lights etc.
- The angle of the light source and the relative angle of a perceiver. That is, the way that light is reflected off an object (or refracted through it).
- The colour of surrounding and contrasting objects. White surfaces can appear to take on the colour of surrounding objects under certain conditions and coloured objects can appear lighter or darker compared to the level of contrast between it and background surfaces while grey objects can appear to be the opposite colour to background surfaces.[102]

Leaving aside this last factor for the moment, what occurs when we see a coloured object is that it appears to us that the object is slightly different in colour when lighting conditions change. But generally speaking we do not say of the object that it has changed colour but that it appears or *looks* different. We readily accept that the object itself remains the same and that the difference is due to changes in illumination. This is also the case when we perceive the size and the shape of an object. We realise that things do not grow larger as we move towards them, nor do they change shape as we tilt them or otherwise change our perspective. In this way then, it is clear that there is a similarity between the way in which we perceive the size, shape and colour of objects. That is, we understand that the apparent colour of an object will change in certain ways given our sensorimotor relation to it:

> Perceivers are in general implicitly familiar with the way apparent colour varies as we move with respect to what we look at, or as other *colour-critical* conditions change (e.g., changes in the character of ambient light,

[102] Noë, *Action in Perception* pp. 125-26. Noë cites Albers *Interaction of Colour* (1963) as the source of this last point.

> or in the colours of contrasting objects etc.). Perceivers implicitly understand the patterns governing this sort of variation, just as they implicitly understand the way that the apparent shape of an object changes as they move in relation to the object.[103]

Although obviously the sensorimotor rules differ slightly in the case of size/shape and colour perception it is still the case that our sensorimotor interactions involve lawful relations between the perceiver and the coloured object and that these relations can be described in terms of movement- and object-related sensorimotor contingencies with the possible addition of luminance-related sensorimotor contingencies, which can still be conceived of in terms of relative movements of the light source, object, and viewer.

In support of this idea Noë cites as evidence the phenomenon of colour constancy. Colour constancy refers to the fact that when one sees a coloured object its apparent colour tends to vary across its surface (due to the angle of the light source or the "*fall*" of the light, shadows from other objects etc.) but in spite of this we recognise that the surface (a wall, for example) is the same uniform colour across. That is, we see that the *actual* colour of the wall is uniform even though it *appears* to be various shades of colour. This is comparable to the fact that we perceive a plate as being round even though it appears to be elliptical due to its perspectival properties. Colour constancy is, Noë argues, an example of "presence in absence."[104]

So, taking into consideration Noë and O'Regan's account of colour perception and the enactive account of perception in general I will now turn to some of the neglected perceptual modalities in order to discuss whether or not such an account can plausibly and non-problematically be applied them.

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[103] Noë, *Action in Perception* p. 127.
[104] Noë, *Action in Perception* p. 127.

3.4 Taste (Gustation)

Intuitively taste, in some respects, seems to be an unlikely candidate to be reconcilable with the enactive approach. It seems more likely that it is contact between taste receptors that is essential to the constitution of taste experiences, not the actual movements of the tongue. Licking etc. are actions, but it is the action of bringing about contact between a flavourant and its receptor rather than movement of particles on or across the taste buds. Our experience of flavours throws up several problems which on first glance the enactive approach seems ill-equipped to handle, not the least of which is the close connection with smell.

The standard models for understanding gustation are quite similar.[105] The standard models for understanding taste; “labelled line” and “across fibre pattern” are roughly as follows: Taste particles – technically known as “flavourants” – come into contact with taste buds which then transmit this information to the brain. The standard accounts differ as to whether the perception of taste involves flavour sensations travelling along singular neuronal paths (labelled line) or if it involves a process of pattern recognition (across fibre pattern). It is also common knowledge that the olfactory system plays a large role in the perception of flavours (and that blocking the nose etc. will greatly reduce the intensity of flavour). This fact alone suggests that taste is not simply at matter of what happens in the mouth.[106]

One of the puzzles of gustation is that it, like olfaction, is prone to desensitivity. A common example of this phenomenon is chewing gum, which, as we commonly say, loses its flavour after we chew it for awhile even though the gum is still giving off

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[105] Lauren M. Jones, Alfredo Fontanini, and Donald B. Katz, "Gustatory Processing: A Dynamic Systems Approach," *Current Opinion in Neurobiology* 16, no. 4 (2006): p. 420 ff.

[106] One suggestion for solving this problem is to suggest that the olfactory system handles the qualitative aspect of flavour while the gustatory system reports on the quantity of the flavour, but this is not a suggestion that can be taken seriously given that we all can and do experience and report different flavour qualities on/from the tongue in real life and in experimental conditions. I will discuss the inter-modal nature of perceptual experience in section 3.6.

flavourants and odourants. In this case there is no way to simply bring back the taste, licking it, rolling it across the tongue, chewing it; none of these *actions* have any effect. If the enactive theory were right, then surely these *actions* would bring the flavour back. This suggests that it is whether or not we can attend to a flavour that is important, and that no amount of sensorimotor activity or knowledge can affect that. In the case of touch and vision one can visit and re-visit sources of sensory stimulation in order to bring back the perceptual experience. In this case, touch simply does not work as a paradigm for understanding perceptual experience. Even if one were able to bring back the perceptual experience through movement this would still not in itself explain the differences in flavour that we experience of and in itself. Nor can it simply be a matter of focusing attention. In other cases, particularly in cases where one wants to try the flavour of something for the sake of tasting it rather than a desire to fill the stomach, one does not generally chew the food rather than let it settle on the palette.

The enactivist can, and does, respond to criticism of this kind by saying only that possible action is necessary, However if it comes to be that the enactive account applies to senses other than vision and touch and it is shown that actions are not necessarily the key to understanding perceptual experience in these cases then it will put pressure on the claims of the enactive approach that perception is a form of action and that touch is the best paradigm for understanding perceptual experience.

Another puzzling aspect of taste is that, besides qualities such as sweetness, sourness, saltiness and bitterness we also perceive qualities in foods that we describe as being hot or cool and so on. Additionally we also perceive particular flavour qualities that we ascribe to different foodstuffs, e.g. “cheesiness/cheese-like,” “beer-flavoured” etc. In the case of hot and cold qualities, (over) exposure to them can be unpleasant and a case in which (temporary) desensitivity to them may in fact be desirable.

The sensation or perception of heat that is experienced when chillies is caused by chemicals within them known as “capsaicinoids”. Unfortunately, simply having a

drink of, or washing out the mouth with water does not neutralise this effect. One study[107] that looks at how to overcome this effect found the following: First, cool liquids are better than room temperature liquids (Naswari and Pangborn are unsure why); second, a little sugar helps; third, capsaicinoids are not very soluble in water but they are in fats so something high in fats will sop up the capsaicinoids; finally and (perhaps) most importantly, the subjects in the experiment reported that making chewing movements with the tongue and mouth helps to neutralise the effect of the capsaicinoids.[108]

This last point suggests that the chewing motion stimulates receptors of mechanical movement in the mouth which perhaps causes a shift in the focus of attention away from the capsaicinoids in favour of motion perception. This is bad news for an enactive account of taste as in this case it seems that the actions commonly associated with taste experiences serve to diminish the perceptual experience rather than enhance it. Supporters of the enactive account may counter this claim by reminding us that when we taste other things, e.g. wine, we can use certain techniques. But I would argue that in such cases the motion of moving a substance around in the mouth and swilling or gurgling it to aerate the wine serves to release the flavourants and odourants from the food which increases the level of access or exposure to them rather than it being a case of the particles moving across the sensory organ as is the case in touch where one moves their hand over an object. Generally speaking, we allow a substance to settle on the tongue rather to chew (or swill) it when we wish to focus on the taste of a substance. Moving the tongue may bring the flavourant into contact with more receptors and increase the intensity of the experience but beyond a certain point continual movement will not continue to increase the intensity or clarity of the experience.

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[107] Chritine Wu Naswari and Rose Marie Pangborn, "Temporal Gustatory and Salival Responses to Capsaicin Upon Repeated Stimulation," *Physiology & Behavior* 47 (1990).

[108] The upside of all this for those that cannot handle their chilli is that hard-frozen sweet ice-cream may be the best solution to capsaicinoid burn.

These qualities of taste perception (heat/cold etc.) also carry with them other perceptual qualities that are not normally considered to be flavours strictly speaking, or at least not sensations restricted to taste. The perception of heat or cold is the obvious example, but when asked; subjects in experiments report other qualities such as stinging, tingling, sharpness, freshness, numbness, pungency and so on. Because the chemicals that are involved in these experiences, e.g. capsaicin, alcohol, peppermint, CO_2, seem to lack the saliency of other tastes or the richness/depth of odours it has been assumed that sensations caused by these chemicals provide perceptual information about stimulus quantity rather than quality.[109] But informal introspection is enough to tell us that these chemicals do produce perceptual experiences that are qualitatively distinct and identifiable. (In short, one can tell the difference between peppermint and chilli). Given that exposure to capsaicin can desensitise a subset of c- and a- sensitive nociceptive fibres Green set out to investigate whether or not the transmission of these sensations is mediated solely, partly or not at all by these capsaicin-sensitive pathways. By desensitising an area of the tongue with capsaicin and then testing subjects Green found that sensitivity to capsaicin in that area had been reduced by 90%, to NaCl (sodium chloride – table salt) 59.9%, to ethanol 51.3% and 68.5% for cinnamic aldehyde, which leads to the conclusion that these other substances stimulate both capsaicin-sensitive and non-capsaicin-sensitive pathways; and the fact that capsaicin sensitivity was not entirely reduced leaves open the possibility that some of the reported sensation (for all these chemicals) was mediated by capsaicin-sensitive pathways that were not fully desensitised.[110]

Subjects in this experiment were also asked to report on qualities other than the sensation of burning. This data shows that while burning and stinging sensations are generally reduced, warmth was practically unaffected and numbness generally

[109] Barry G. Green, "Capsaicin Cross-Desensitization on the Tongue: Psychophysical Evidence That Oral Chemical Irritation Is Mediated by More Than One Sensory Pathway," *Chemical Senses* 16, no. 6 (1991): p. 675.
[110] Green, "Capsaicin Cross-Desensitization on the Tongue: Psychophysical Evidence That Oral Chemical Irritation Is Mediated by More Than One Sensory Pathway," p. 678.

increased.[111] A follow up experiment asked the subjects to also report on the clarity of these sensations (or the confidence they had in reporting these sensations). In this experiment burning and stinging were again significantly reduced but the clarity of these experiences was reduced in line with the reduced intensity, whilst warmth and numbness were unaffected. The results of these experiments show that some components of taste can survive capsaicin desensitisation and that these qualities are mediated by more than one sensory pathway. On the other hand these results also support the hypothesis that sensations of burning or stinging are primarily transmitted via capsaicin-sensitive pathways whereas warmth and numbness may be primarily mediated by one or more non-capsaicin-sensitive pathway.[112] These experiments also show that taste is a highly complex perceptual system in which various qualities overlap or intermingle.

The orthodox models of taste perception, labelled line and across fibre pattern, are in essence “input-models” of perception. The difficulty in accepting such models of taste perception is that they assume taste perception is a matter of simple spatial encoding but the fact that responses in the taste system are modified by many factors means these models fail to account for certain aspects of gustation.[113] Desensitation is but one example of how taste perception can be modified. Activity in nearby papilla (which house taste buds) and nearby taste buds can affect activity in a taste bud. Responses can also be affected by the parasympathetic system as well as other activity from various parts of the brain; not to mention the fact that the taste and olfactory perceptual systems are highly integrated.[114] Another important factor is that one can become accustomed to a taste that was perhaps repulsive on first exposure to

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[111] Green, "Capsaicin Cross-Desensitization on the Tongue: Psychophysical Evidence That Oral Chemical Irritation Is Mediated by More Than One Sensory Pathway," p. 680. In the case of ethanol warmth was reported only after capsaicin treatment

[112] Green, "Capsaicin Cross-Desensitization on the Tongue: Psychophysical Evidence That Oral Chemical Irritation Is Mediated by More Than One Sensory Pathway," p. 686.

[113] Jones, Fontanini, and Katz, "Gustatory Processing: A Dynamic Systems Approach," p. 421.

[114] Jones, Fontanini, and Katz, "Gustatory Processing: A Dynamic Systems Approach," p. 421.

it. According to Jones et al. experience-related taste changes, or taste learning, can happen over a few hours which is evidence of the "plasticity" of the system.[115] Jones *et. al.* also argue that attentional states and expectations can affect taste responses. For example, subjects who are told to expect a mild taste will find a repulsive flavourant only mildly distasteful. This has led to the hypothesis that states of expectation lead to the retrieval of gustatory information from long-term memories which then affects the processing of sensory input.[116] For these reasons they argue that:

> Future advances in our understanding of taste processing will require that we look at stimulus response patterns in a new light, as the culmination of ongoing internal network dynamics from a temporally evolving, distributed and densely interconnected multimodal network, rather than as a direct representation of strictly external chemosensory qualities.[117]

What Jones *et. al.* are calling for is a dynamic-systems style approach to understanding taste. Given that Noë and O'Regan see their enactive approach to perception as an ally to (or extension of) dynamic-systems and embodied cognition approaches to perception[118] then their approach becomes a contender to potentially explain taste. However, consideration of the nature of taste also points out elements of the enactive approach that need to be amended if it is to explain taste. The enactive approach states that our perceptual processing is constituted (at least in part, if not wholly) by our expectations of how sensory stimulation will be effected by movements of the sensory apparatus. In the case of taste, neither movement – nor our knowledge of possible movements – of the sensory apparatus necessarily impacts the way that we perceive sensory stimulation.

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[115] Jones, Fontanini, and Katz, "Gustatory Processing: A Dynamic Systems Approach," p. 422.
[116] Jones, Fontanini, and Katz, "Gustatory Processing: A Dynamic Systems Approach," p. 423-24.
[117] Jones, Fontanini, and Katz, "Gustatory Processing: A Dynamic Systems Approach," p. 424.
[118] O'Regan and Noë, "A Sensorimotor Account of Vision and Visual Consciousness," p. 970.

On this basis, touch does not seem like a very good paradigm for understanding taste. In the case of touch, the expectations that we form of impending sensory stimulation are of an entirely different nature. I am sure that everyone has had the experience of putting something into their mouth and discovering that it has a different taste to the one they expected. In ordinary circumstances these expectations are no doubt formed by the smell (which is no doubt a good indicator); as well as the colour and general look of the food or drink; or by what people tell you it will taste like. As an example of how the enactive approach applies to touch, Noë and O'Regan use the example of the game that involves working out what a hidden object is by touch (discussed previously).[119] They explain that the point of this example is that the sensory information one receives does not make much sense until one identifies it. Once identified, the object can be controlled or explored with the fingers to reveal other aspects or properties of the object that you now expect to be present and which you previously did not. Yes, in the case of touch one has to move one's finger in order to bring about the appropriate sensory stimulation, but that does not necessarily mean that it is the *movement* of the finger/s that gives rise to the expectations of what that sensory stimulation will be. Although Noë and O'Regan often state as fact that our perceptual experience is constituted by expectations of (movement-related) sensory stimulation, they do not provide any explanation of where these expectations come from, how they are formed, or what form they take. Taste provides us with examples of how other factors, including mental states and input from other sensory systems, also play a role in forming expectations of sensory stimulation. This aspect of perceptual experience is lacking from the enactive exposition. Properly understood, this insight may also help to explain phenomena such as change/inattentional blindness in which our expectations of what we will and can see also play an important role.

[119] Discussed previously in chapter 1, section 7.

3.5 Smell (Olfaction)

Olfaction seems on first glance to be a simple enough process. Chemicals or scent particles enter the nose where it is detected, recognised and… and? While vision, touch and hearing have been studied and speculated on for millennia, smell and taste have generally been dismissed as not as interesting or important by many who have put forward theories of perception. Or perhaps rather, it is generally considered to be such a straightforward process that it is not considered to be interesting enough from a theoretical point of view. It is worth noting that only as recently as 2004 the Nobel Prize for medicine was awarded to Linda Buck and Richard Axel for their work on understanding the olfactory system (which they, and others since, began in the early 1990's). According to Buck:

> It is estimated that humans can sense as many as 10,000 to 100,000 chemicals as having a distinct odor. All of these "odourants" are small, volatile molecules. However, they have diverse structures and somehow those different structures are perceived as having different odors…
> Odourants are initially detected by olfactory sensory neurons, which are located in the olfactory epithelium lining the nasal cavity. Theseneurons transmit signals to the olfactory bulb of the brain, which then relays those signals to the olfactory cortex. From there, olfactory information is sent to a number of other brain areas. These include higher cortical areas thought to be involved in odour discrimination as well as deep limbic areas of the brain, which are thought to mediate the emotional and physiological effects of odors.[120]

These olfactory sensory neurons, or olfactory receptors, are found in a wide range of vertebrates. Sequencing the human and mouse genomes has revealed that humans have approximately 350 odourant receptors (while mice have approximately

[120] Linda B. Buck, "Unravelling the Sense of Smell (Nobel Lecture)," *Les Prix Nobel* (2004): p. 267.

1000). These odourant receptors are found in distinct, non-overlapping spatial zones within the olfactory epithelium and (according to the standard theories/models) are used combinatorially to encode odours. As each odourant receptor can serve as one part of the code for many different odours then this combinatorial coding scheme can accommodate a practically unlimited number of odourants. A slight change in the structure or concentration of an odourant can have a dramatic change to the perceived odour. (In the case of higher concentration this may be explained by the fact that more odourant receptors respond to the odourant.) These odourant receptors each send a single axon to the olfactory bulb of the brain that synapses with the dendrites of the bulb neurons in a spherical structure known as a glomerulus. In the olfactory bulb the sensory information from the nose is organized into a “stereotyped sensory map” that is similar in different individuals and which remains constant over time whereas the sensory neurons in the epithelium have a short life span and are continuously replaced. Axons from neurons in the olfactory bulb form synapses with neurons in the olfactory cortex in distinct bilaterally symmetrical locations for each odourant receptor (which, again, is similar in different individuals). But whereas inputs from different odourant receptors are spatially separate in the olfactory bulb they are likely to overlap in the cortex, which, Buck argues, suggests that neurons in the olfactory cortex function as coincidence detectors activated by correlated combinatorial inputs from different odourant receptors that may serve as “an initial step in the reconstruction of an odour image from its deconstructed features.”[121]

This account of the process of olfaction is not easily reconciled with the enactive approach to understanding perception. In the process of smelling outlined above there is no sense in which one actually moves one’s sensory apparatus to determine, probe or explore environmental details; and certainly not according to sensorimotor laws. The only way in which it could be said that bodily movement affects olfaction is by increasing or decreasing the (qualitative) intensity of the experience by

[121] Buck, "Unravelling the Sense of Smell (Nobel Lecture)," p. 267-82. This story sounds somewhat similar to the across-fibre pattern account of taste but I cannot say for sure if one came before the other. Searching “PubMed” and similar databases suggests that they emerged at around the same time, perhaps not surprisingly.

moving closer or further away from the source. But in this case it is not the movement of the odour receptors *per se* that affects the perceptual experience but rather that the change in number/density of odourant particles that affects the experience. Experiments with rats and mice have also found that time of exposure is also an important factor. In these experiments rodents required a longer period of exposure to achieve a level of accuracy in a difficult discrimination task equivalent to the level of accuracy achieved in easier discrimination tasks in shorter periods of time.[122] Given that the information from the olfactory cortex is used by other areas of the brain (which classify this information and use it in decision making) and that time of exposure is a factor of accuracy then it seems to me that this is evidence that the olfactory system actively constructs and uses (mental) representations of some kind as part of the process. No amount of knowledge of the laws of sensorimotor dependence can help you to probe for a scent that is overpowered by another. In this case it seems that the key ingredients in the perceptual experience of smell are the number of odourants that come into contact with the odourant receptors (for that odourant) in the nasal epithelium, the activation of sensory maps in the olfactory bulb and the olfactory cortex, and the ability to recognise that an odourant that is represented by a particular map has been encountered before and that such a map represents, for example, the odour of a rose.

[122] Dmitry Rinberg, Alexei Koulakov, and Alan Gelperin, "Speed-Accuracy Tradeoff in Olfaction," *Neuron* 51, no. 3 (2006): p. 356.

3.5 b The Vomeronasal System (Pheromones)

> There is nothing analogous to knowing how to position one's nose to pick up a good scent, or the better to smell something, in the domain of vomeronasal information.[123]

In, *On What we See* (2002) and *Action in Perception* (2004), Noë comes to the above conclusion about the vomeronasal system. Basically, what this means in terms of the enactive approach to perception is that the vomeronasal system cannot be included as a perceptual modality as the enactive approach defines them. However, given that the vomeronasal system is similar to the olfactory system then it is worth asking why it is not and if it follows from this that olfactory system is not, or should not be, considered to be a perceptual modality by the enactive approach.

The vomeronasal system, even more so than the olfactory system, has been neglected and misunderstood until recently, and remains so in humans. For some time it was considered by anatomists and psychologists to not even exist or have any function whatsoever in humans.[124] The vomeronasal system is the system that is used to detect pheromones. The vomeronasal organ (or Jacobson's organ) is found in most vertebrates except for fish and birds.[125] The vomeronasal organ is an olfactory structure in the nasal septum from which signals are transmitted via vomeronasal organ neurons then through the accessory bulb to the medial amygdala and to the hypothalamus; areas of the brain associated with hormonal and behavioural responses to pheromones.[126] In humans however, it has not been clearly shown that there are

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[123] Alva Noë, "On What We See," *Pacific Philosophical Quarterly 83(1): 57-80* (2002): p. 69.
[124] Karl S. Kruszelnicki, "Sex Organ up Your Nose," (Karl S. Kruszelnicki Pty Ltd / Australian Broadcasting Corporation, 1998).
[125] Michael Meredith, *The Vomeronasal Organ* (FSU, [cited 19/2/07 2007]); available from http://neuro.fsu.edu/%7Emmered/extendedText.htm.
[126] Buck, "Unravelling the Sense of Smell (Nobel Lecture)," pp. 267-68.

successful neural connections between the human vomeronasal organ and the brain nor has the accessory bulb been clearly identified.[127]

But on the other hand two families of receptors, “V1Rs” and “V2Rs”, have been found in the human olfactory system; and given that genes of the same type are found in the vomeronasal organ, then it is possible that they may in fact be pheromone receptors.[128] In other mammals (rabbits, sheep and pigs) it has been shown that vomeronasal lesion or occlusion does not inhibit pheromone detection and response, while snakes also show evidence of being able to detect non-pheromone chemicals with their vomeronasal organ.[129] In short, it seems likely that pheromones can be detected by the olfactory system and it is not clear that the vomeronasal organ is used exclusively to detect pheromones. While there is little in the way of evidence to support the claim, it is generally taken to be the case that humans are sensitive to pheromones that elicit hormonal or emotive responses; a claim Noë agrees with.[130] However the precise nature of these effects is open to dispute. The only evidence in support of emotional/physical responses to pheromones (i.e. changes to heart-rate, small reduction in testosterone levels) are actually responses to a type of chemical known as “vomeropherins,” not pheromones, and is reported by scientists backed by a company promoting these products as therapeutic agents and implying that they are pheromones.[131]

The other evidence often cited to support this claim is the theory that female menstrual cycles will synchronise if they are living in close quarters and smelling each others pheromones (or if this situation is created artificially). Again, this is a claim that Noë does not dispute. However the fact that not all women exposed to the same pheromone experimentally (70% in the original study, but less in later cases) became synchronised means that something else may be going on. McClintock, who first

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[127] Meredith, *The Vomeronasal Organ* ([cited). This obviously motivates the claim that it does not function in humans.
[128] Buck, "Unravelling the Sense of Smell (Nobel Lecture)," p. 272.
[129] Meredith, *The Vomeronasal Organ* ([cited).
[130] Noë, "On What We See," p. 69.
[131] Meredith, *The Vomeronasal Organ* ([cited).

proposed and studied this effect in 1971 has since discovered that the changes that take place in a woman's menstrual cycle are that it gets longer or shorter depending on what part of the cycle the pheromone "receiver" is compared to the "supplier".[132] That is, synchronisation may be somewhat random. So rather than being a case of strict hormonal physiological change, the effect of this pheromone could be construed as a social signal that a certain time is a good time to ovulate and conceive, or not, which is not to say that this is in any way a *conscious* (or perceived) signal.[133]

And finally, in relation to the quote at the beginning of this section, there is in fact a way that some animals, but probably not humans, can act to better detect pheromones vomeronasally. The "Flehmen" response (reaction, position or "flehmening") is a kind of open-mouthed snort which increases airflow into the vomeronasal organ of horses (and other ungulates) as well as felids/felines, which allows more pheromones to reach to vomeronasal organ. In other words, it *is* like a sniff.[134]

The significance of the facts concerning the human vomeronasal is problematic for Noë and O'Regan's claim that olfaction is governed by knowledge of sensorimotor contingencies. It would not be such a problem if Noë is merely arguing that we do not *perceive* vomeronasally. Based on our own (phenomenological) reflection we may accept Noë's claims that the are no "vomeronasal appearances, in the way that there are visual and tactile appearances"; we can agree that the is no such thing as "vomeronasal experiences [and that t]here is no activity of exploring how things are as mediated by one's encounter with how they vomeronasally appear."[135] However we cannot agree with Noë's final claim, which he bases on these two claims, that animals with a more developed vomeronasal capability "do not master the patterns of

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[132] Norman Swan and Martha McClintock, *Menstrual Synchrony* [Interview Transcript] (1998 [cited 19/2/2007 2007]); available from http://www.abc.net.au/rn/healthreport/stories/1998/11122.htm.
[133] Swan and McClintock, *Menstrual Synchrony* ([cited).
[134] Snakes and other reptiles, on the other hand, gather pheromones with their tongue and "manually" supply them to their vomeronasal organ
[135] Noë, "On What We See," p. 69.

vomeronasal-motor contingencies that mediate their causal influence."[136] The evidence from the animal kingdom clearly shows that at least some animals do have ways to mediate their sensory relation to pheromones in their environment.

Given that in the case of olfaction the only way we can use our knowledge of sensorimotor contingencies to mediate our relation to (the qualitative aspect of) scents is to sniff (or breath through the nose) then, in contradiction to the quote from Noë at the beginning of this section, there does exist something analogous to the way we use our nose in olfaction in the domain of vomeronasal information. Of course Noë could respond by saying that, in this case, the enactive approach might apply to (some) animals in a way that it does not apply to humans. And we might well be inclined to agree. This creates a dilemma for the claim that the enactive approach applies to human olfaction. Given that the human vomeronasal system does not seem to be fully functional (or fully developed/existent), and that receptors have been found in the olfactory system, then it seems more likely that the olfactory system could act (at least in some way) as our pheromone detection system. The claim that we do not perceive vomeronasally may be misguided in that for all we know some of the things we refer to as smells may be (at least partially) the perceptual experience of pheromones.

If one group of odourants (i.e. pheromones) can deliver environmental information to the nervous system without our being conscious of it, or having experience of it, then we still need an explanation as to why other odourants do *cause* experiences (or experienced qualities) if the enactive approach is to apply to olfaction. Given that the mechanisms involved in both cases are the same, then the answer is clearly not sensorimotor. If taking a sniff or turning one's nose is considered enough for olfactory experience to be constituted by knowledge of sensorimotor contingencies then it should be enough to constitute the experience of pheromones. So either Noë has to concede that the enactive approach does not apply to olfaction at all or that it only applies to spatial/ego-centric information, e.g. the source/location of a scent, and that

[136] Noë, "On What We See," p. 69.

the qualitative aspect of an olfactory experience requires a different explanation. The only other option is to appeal to the idea that the spatial encoding of smell in the olfactory bulb and olfactory cortex is due to a similar evolutionary development to touch. However this seems to suggest that our fully developed sense of smell is, in terms of qualitative experience, largely representational. Which therefore still means olfactory experiences are not entirely constituted by knowledge of sensorimotor contingencies.

3.6 a Inter-Modal Perceptual Experience

One aspect of perceptual experience that is not very well understood is the way that sensory systems can work together or against each other during perceptual experience. It is commonly recognised that the olfactory and gustatory systems work together or impact one another yet how and why they do is not clearly understood. Generally speaking, the fact that some perceptual experience results from such interactions is not a major problem for the enactive approach. The enactive approach states that perceptual experience is constituted by exercising the skills that we have to probe and explore environmental detail. This does not rule out such skills drawing upon sensory stimulation from more than one modality. Given that some of the examples that Noë and O'Regan use to describe and discuss perceptual experience (driving, riding bikes and horses etc.) seem to involve sensory stimulation from more than one modality then it seems as if sensory system interaction is an implied aspect of their approach, although not one that they spend any time discussing. In this section, I just want to mention a few such cases to see what we can learn from them as regards perceptual experience in general.

The obvious case of inter-modal perception is gustation and olfaction, which work together in the perception of tastes. In addition to this the taste system can also

mediate tactile experiences as well as some olfactory sensations.[137] These olfactory sensations may be limited to the more pungent odourants but it is still interesting none the less that interaction between these two systems works both ways. As discussed above, neither system seems to rely on knowledge of sensorimotor contingencies and further evidence of interaction between these systems puts extra pressure on this claim of the enactive approach.

As well as this there are interactions between the visual and the auditory systems. Experimental conditions reveal how the interaction between these systems has a distorting effect on perception. One of these effects is known as the "ventriloquism effect" and comes in at least two varieties. The spatial ventriloquism effect refers to the findings that when subjects are given the task of locating the source of a sound and are given a visual cue (which they are told to ignore) as well as an auditory one there is a strong visual bias in the perceived location of the sound. That is to say that the perceived location of the sound source will be displaced towards the source of the visual cue. In temporal ventriloquism, subjects are asked to tap a button in time with a visual signal and to ignore an accompanying auditory signal and vice versa. This study found that a moving rather than a flashing visual signal is more accurate. In this case there is a strong auditory bias of apparent visual occurrence in time and a smaller visual bias of apparent auditory occurrence point.[138] These two effects support the hypothesis that there is a strong visual bias (or dominance) in spatial discrimination tasks and a strong auditory bias (or dominance) in temporal discrimination tasks. These ventriloquism effects are a mixed result for the enactive approach. On the one hand, the finding that a moving visual signal is more accurate than a flashing visual signal seems to support the enactivist claim that perception is constituted by practical knowledge of movement-dependent sensorimotor

[137] D. A. Leopold et al., "Human Thalamic Nucleus Mediating Taste and Multiple Other Sensations Related to Ingestive Behavior," *The Journal of Neurophysiology* 77, no. 6 (1997): p. 3408.

[138] Gisa Aschersleben and Paul Bertelson, "Temporal Ventriloquism: Crossmodal Interaction on the Time Dimension: 2. Evidence from Sensorimotor Synchronization," *International Journal of Psychophysiology: Current findings in multisensory research* 50, no. 1-2 (2003): p. 162. Aschersleben and Bertelson also argue that intermodal interaction is only useful for combinations originating in the same external event.

contingencies. On the other hand, the enactive approach does not seem to be able to account for why one of these modalities dominates the other if touch is the paradigm through which we should understand perceptual experience. This is further disputed by findings that roughness discrimination is distorted by visual-auditory interaction and that such distortion is dependent on which sensory modality one attends to.[139]

The "McGurk Effect" is an audio-visual illusion that produces audio illusions due to a false visual cue which (again) raises problems not addressed by Noë or O'Regan. In experiments conducted by McGurk and MacDonald in which subjects watch a video of a person mouthing the phoneme [ga] which as been overdubbed with an audio track of the person saying [ba], the result is that most normal subjects report hearing [da].[140] This effect is robust and instantaneous, merely opening and closing the eyes is enough to change the percept from [ba] to [ga] and subjects do not habituate over time.[141] This phenomenon raises a number of questions for the enactive approach, which it does not seem to have a ready made explanation of. If perception is to be understood in terms of knowledge of (movement-related) sensorimotor contingencies then how is it that subjects do not learn which sensorimotor contingencies apply in this experiment over time? In certain optical illusions one can "see-through" the illusion or switch from one image to the other by employing their powers of attention (and presumably knowledge of sensorimotor contingencies, according to enactive approach) but this is not an option in this case.[142]

If the subject is watching the video without the audio, [ga] can be interpreted as [da] – and [ka] can be taken as [ta] – while [ba] and [pa] can be confused with each other but not with [ga], [da], [ka] or [ta]. McGurk and Macdonald point out that in

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[139] Steve Guest and Charles Spence, "What Role Does Multisensory Integration Play in the Visuotactile Perception of Texture?," *International Journal of Psychophysiology - Current findings in multisensory research* 50, no. 1-2 (2003).
[140] Harry McGurk and John MacDonald, "Hearing Lips and Seeing Voices," *Nature* Vol. 264 (5588) December 23/30 (1976): pp. 746-47. Other examples use [ka]/[pa]/[ta] as well as combinations of these short phonemes
[141] McGurk and MacDonald, "Hearing Lips and Seeing Voices," p. 747.
[142] To try this for yourself see: A.M. Liberman, P.C. Delattre, and F.S. Cooper, "The Role of Selected Stimulus Variables in the Perception of the Unvoiced-Stop Consonants.," *American Journal of Psychology* 65 (1952).

auditory terms vowels “carry” information from the preceding consonant[143] and suggest the following hypothesis:

> If we speculate that the acoustic waveform for [ba] contains features in common with that for [da] but not for [ga], then… in a ba-voice/ga-lips presentation there is visual information for [ga] and [da] and auditory information with features common to [da] and [ba]. By responding to the information common in both modalities, a subject would arrive at the unifying percept [da]. Similar reasoning would account for the [ta] response under pa-voice/ka-lips presentations.
>
> By the same token, it could be argued that with the ga-voice/ba-lips and ka-voice/pa-lips combinations the modalites are in conflict, having no shared features. In the absence of domination of one modality by the other, the listener has no way of deciding between the two sources of information and therefore oscillates between them.[144]

If this hypothesis is correct, then the enactive approach could explain these results by arguing that in these cases, where similar or identical sensorimotor contingencies are in play then the percept one experiences is the one that is present twice. However the enactive account, as it stands, would still owe an account of how it is that this process occurs without breaking its self-imposed restriction on internal representations. And further, in the ga-lips/ba-lips combination the enactive approach also needs to account for why one takes dominance over the other. A further complication for the enactive approach comes in the form of the findings of McGurk and MacDonald that in cases where one modality dominates it is usually the auditory domain for children and the visual for adults.[145] Again, given that the enactive approach favours touch as the paradigm for understanding perception, it is unclear why dominance would switch from the auditory domain to the visual domain over the course of ones life. Radeau and Colin suggest that these sorts of effects may be explained by

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[143] Liberman, Delattre, and Cooper, "The Role of Selected Stimulus Variables in the Perception of the Unvoiced-Stop Consonants.."
[144] McGurk and MacDonald, "Hearing Lips and Seeing Voices," p. 747-48.
[145] McGurk and MacDonald, "Hearing Lips and Seeing Voices," p. 747.

the existence of “Multi-sensory” neurons that have been located in the brain in different species and different parts of the brain.[146] This also suggests that internal representations play a role in speech perception, and a more general unity of the sensory/perceptual modalities, which is not clearly accounted for in Noë’s version of the enactive approach.

3.6 b Inter-Modal Perceptual Experience: Noë and Hurley on Neural Plasticity and Consciousness (Cortical dominance and Cortical deference)

Noë and Hurley in *Neural Plasticity and Consciousness* provide a sensorimotor account of how sensory stimulation from one modality can give rise to experiences by using the neural/cortical resources that are normally used by another modality, and, how perceptual experience can change its qualitative expression intra-modally. In order to explain how these inter/intra-modal changes occur they introduce a distinction between “cortical dominance” and “cortical deference”.

“Cortical dominance” refers to the types of experience that occur when sensory stimulation is routed to a non-standard neuronal/cortex target and takes on the qualitative character that is normally associated with that part of the brain. An example of this is cases of phantom limbs whereby sensory stimulation from the face can cause the qualitative experience of stimulation from an absent limb because the area of the brain that would normally be associated with stimulation from that missing limb has been subsumed by and used to receive sensory stimulation from the face.[147] This is also an example of intra-modal dominance as these two areas of the brain are within the somatosensory cortex.

Cortical deference” refers to the types of experience that occur when sensory stimulation takes on the qualitative expression (of experience) typical of the abnormal

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[146] Eric L. Amazeen et al., ""on Specification and the Senses": Comments and Reply," *Behavioral and Brain Sciences* 27, no. 6 (2004): p. 890.
[147] Hurley and Noe, "Neural Plasticity and Consciousness," pp. 133, 36-37.

source of sensory stimulation. For example, (early blind) readers of Braille will activate their visual cortex while reading but the experience of reading is qualitatively tactile.[148]

The interesting thing about cases of neural plasticity such as these, particularly cortical deference, is that they clearly show that the qualitative characteristics of perceptual experience is not (wholly) dependent upon which areas of the brain are active during perceptual experience. If one were to assume (as I take it that many people would) that the qualitative aspect of experience is determined by which areas of the brain are active then it is it would seem inexplicable that cases such as these could ever occur. Furthermore, intermodal and intramodal changes in the qualitative characteristics of perceptual experience do not necessarily involve neural plasticity according to Noë and Hurley. They argue that TVSS and reversing goggles experiments demonstrate this. In the case of subjects using TVSS systems the subject has perceptual experiences that are "vision-like" in certain ways and yet neither the visual cortex nor, obviously, the eyes are used.[149] TVSS is therefore an example of intermodal plasticity without neural plasticity or re-routing. In the case of subjects using reversing goggles the visual field appears to be reversed which, they argue is a case of (visual) intramodal plasticity without neural plasticity or re-routing.[150] This last claim can been challenged by those such as Harris who dispute the fact that vision does in fact appear to be reversed at all. But, Noë and Hurley argue, even if it is the case that things only *seem* to be visually inverted then we have a case of intramodal proprioceptive adaptation rather than visual.[151] Although TVSS does not provide the user with fully fledged visual experiences (e.g. the user does not see colours) and although the person wearing reversing goggles does not fully adapt to wearing them (e.g. letters/words do not necessarily appear "the right way round" after adaptation) these experimental situations do provide examples of experiences that are qualitatively unlike those experiences that are normally associated with activity in the relevant parts of the brain.

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[148] Hurley and Noe, "Neural Plasticity and Consciousness," p. 134.
[149] Hurley and Noe, "Neural Plasticity and Consciousness," pp. 141ff.
[150] Hurley and Noe, "Neural Plasticity and Consciousness," pp. 148ff.
[151] Hurley and Noe, "Neural Plasticity and Consciousness," pp. 151-52.

As the qualitative character of these sorts of experiences cannot be explained by referring to either the particular parts of the brain or the sensory apparatus that is involved, constitutively, in these experiences then we require some other means by which to explain the nature of these experiences. Noë and Hurley, naturally, offer a dynamic sensorimotor understanding of the qualitative character of these experiences. According to their thesis it is the modality of the sensorimotor contingencies rules that are in play that determines the qualitative expression of the perceptual experience:

> What drives changes in the qualitative expression of a given area of the cortex, and hence what explains the difference between dominance and deference, is not simply a remapping from the source of input, whether internal or external, to that area of cortex, but rather higher-order changes, in relations between mappings from various different sources of input, which are in turn fed back to various areas of cortex.[152]

So according to an enactive/sensorimotor understanding of perceptual experience it is the type of sensorimotor rules that are used to disambiguate sensory input which determines the qualitative character of the perceptual experience. For example, the content and nature of perception experienced by users of TVSS systems is governed by sensorimotor contingencies that are identical to those governing “normal” visual experiences rather that those that govern tactile or auditory experiences.

There are two key points emphasised in this discussion, curiously lacking from Noë and O’Regan’s main statements of the enactive approach, which I think can be used to realign the enactive approach in a more satisfying manner. The first is a clear admission that there is some form of higher-order mental processing going on in the background of experience (i.e. changes in brain states) and that the “qualities of experience reflect practical knowledge of higher-order sensorimotor patterns.”[153]Noë and Hurley do not spell out how this practical knowledge actually affects perceptual experience but it is made clear in such statements that the brain most definitely does

[152] Hurley and Noe, "Neural Plasticity and Consciousness," p. 146.
[153] Hurley and Noe, "Neural Plasticity and Consciousness," p. 154.

play a role in perceptual experience. What Noë must make clear is that the enactive approach denies only that the qualitative nature of experience is determined by any particular part of the brain that is normally associated with a particular type of experience. Clearly the brain does plenty of work disambiguating sensory stimulation. Secondly, this practical knowledge of sensorimotor contingencies is "fed-forward" through the system to the source of sensory input (and back again) as an essential and constitutive part of the process/activity of perceptual experience. Again, this is not something that Noë and O'Regan have attempted to explain in their account of the enactive approach.

The way in which this practical knowledge is fed through the perceptual system is identical to the way in which information is fed forward in the processing of taste and pain[154] that I have argued can be construed as a type of representational process. The only way that such a system makes sense to me is that if the rules governing changes in sensory input are fed forward then these sensorimotor rules must imply an expectation that sensory stimulation will be modified in a specific way by specific movements or actions involving sensory apparatus. That is not to say that experience is

[154] The mechanisms behind the experience of pain are reasonably well known in so far as it involves signals being sent from different body parts to the brain (and back) via the nervous system. Science continues to refine our understanding of all the details of how this system works, however the basic mechanistic explanation of pain remains an accepted framework to understand the experience of pain. The biggest, or perhaps most interesting, refinements to the general framework has been the development of the "gate-control" theory. In short, this theory posits that certain neural mechanisms that link the peripheral nociceptors (nerve fibres) to the spinal chord that act as "gates" which modulate or regulate the amount of nerve-impulse transmission from the periphery to the spinal cells ("Transmission"/"T-cells"). Reaching or exceeding a certain critical level produces an "output" from this gate that is registered as pain. The output from such gates is regulated by various excitatory and inhibitory signals from the brain.
Such signals may be seen as analogous to the way that the gustatory system can prepare itself for certain input, can expect certain input. For example, one can *brace* themselves in anticipation of pain. In some ways it may seem to be the opposite, in that one would rather not experience pain, but certain other bodily experiences that are enjoyable/pleasurable could count among those in which excitatory rather than inhibitory signals are involved. This also seems to be the case in gustation wherein the gustatory system can be tricked into expecting a mild or intense sensation that affects the subjective perception of a flavourant.
For in depth discussion see: Murat Aydede, ""Introduction: A Critical and Quasi-Historical Essay on Theories of Pain"," in *Pain: New Essays on Its Nature and the Methodology of Its Study*, ed. Murat Aydede (Cambridge MA: Bradford Book / MIT Press, 2005).

constituted by such rules before or without the appropriate sensory stimulation or that perception is the perception of such mental states. As Noë and Hurley state such states of the nervous system "may be qualitatively translucent rather than transparent."[155] In other words, we do not have access to these patterns of sensorimotor expectancy, at least not at the personal level. They sit just behind or below the level of experience awaiting or perhaps even guiding movements of sensory apparatus in the same way that the tongue "expects" a certain type of stimulation. I propose that these types of mental states constitute a type of representation of (expected or anticipated) sensory stimulation or perceptual input. Not the type of representations that Noë rages against, but a type of representation (or representational process) none the less. Of course these representations are certainly not "high-resolution" or detailed and are not necessarily accurate, and given that they are not we can also understand why we experience a sense of surprise when things do not appear to be the way that we might expect.

3.7 Possible Responses

Exploring the claim that the enactive approach to perception can be applied to all of the perceptual modalities puts pressure on many of the main claims of the enactive approach. In one way or another each of these challenges requires that some sort of amendment be made to the enactive approach; or for the enactive approach to make a clear statement with regards to which perceptual systems it does apply to; or which aspects of perceptual experience it applies to. I will now outline the ways that the enactive approach could respond to some of these challenges.

[155] Hurley and Noe, "Neural Plasticity and Consciousness," p. 161.

The Dual Content Response:

The claim that pain and bodily sensations do not represent the world as being a certain way can be accommodated by the enactive approach as being perceptual experience of one type of content. The fact that Noë does say at times that perception usually involves (the perception of) both types of content could lead the enactive approach to conclude that these systems are not really types of “full-blown” perceptual experience, or at least not ordinarily. Either way seems to be appropriate under the enactive approach, and they are not mutually exclusive statements. So the enactive approach could hold both positions without contradiction. In my opinion the enactive approach should place more emphasis on the first position, as it seems apparent that such information is available and used by us, in a constitutive way, in the course of perceptual experience. In this sense then such modalities would help constitute the *feeling* of certain perceptual activities that involve inter-modal sensory stimulation in other modalities, while when we experience things such as pain (or proprioception etc.) we are perceiving only one type of content. However this response does not solve all the problems for the enactive approach raised by some of the perceptual modalities.

The Spatial Quality Response:

The enactivist could respond by insisting that the account only be applicable to spatial qualities of perceptual experience. This response would involve accepting that taste and smell are fundamentally different to sight, touch and hearing. Taste and smell are essentially chemical-senses that do not seem to be easily incorporated under the enactive approach. The other modalities are concerned with sensory stimulation that is external to the body and can be understood in terms of ego-centric spatial characteristics. These characteristics lead to perceptual experiences that contain both kinds of “dual-content.” So the enactive theorist could argue that perceptual experience proper is the perception of spatial perceptible qualities. This response would also deny that taste, smell and pains etc. are “full-blown” perceptual modalities.

However both these responses call for a very restricted definition of what counts as perceptual experience that seems to fall well short of the aims of Noë and O'Regan. Also, it could be argued that there are qualities present in perception that cannot be understood in spatial terms, and that perceptual experience does not always consist of both types of content. And, it seems to me that Noë and O'Regan would concede both these points.

The problem here is that touch is thought of as the paradigm for all perceptual experience. Berkeley, who also held touch to be the paradigm for understanding perception, influences Noë. But, what Noë omits from Berkeley's account is the fact that he thought this to be the case because of its links to spatial qualities which he held to be absent from vision *per se*.[156] So, it seems to me that one way to resolve some of these problems is to amend the claim that touch is the paradigm for understanding perceptual experience to the claim that touch is the paradigm for understanding some aspects of perceptual experience, namely spatial, or at best that it is a useful paradigm for understanding perceptual experiences that involve spatial discriminations (or "spatial-perceptual" modalities). This sort of response will also ease the pressure on the claim that perception is constituted by our knowledge of sensorimotor contingencies if it is also accepted that movement related sensorimotor contingencies play a (major) role in the spatial aspects of perception but not all aspects of all perceptual experience. This sort of response, however, is almost a concession that the enactive approach does not, strictly speaking, fully explain all perceptual experience – perhaps only touch, sight and hearing.

The Attention-Based Solution:

One of the things that is learnt by exploring the sensory modalities other than vision and touch is that there is plenty of evidence to suggest that perceptual experience is at least partly dependent upon the state of the nervous system prior to and during sensory stimulation. Taste, pain and possibly smell, provide examples of

[156] Charles Siewert, "Is the Appearance of Shape Protean?," *Psyche: An Interdisciplinary Journal of Research on Consciousness* 12, no. 3 (2006): pp. 12-13.

experiences in which the type of stimulation that the system expects can affect perceptual experience. In the case of taste, what we find is that the qualitative aspect of the experience is more or less intense depending upon what type of stimulation is expected. What this amounts to is that the level of attention that a certain type of stimulation receives is dependent upon the level to which such stimulation is expected. The problem for the enactive approach is that a "state of expectancy" that is constituted by the nervous systems openness to a particular stimuli can be thought of as a type of representation, the sort of thing that is specifically rejected by Noë and O'Regan.

But I think that the enactive approach can accommodate the challenge posed by the existence of neural-representations, and be all the better for it. It does involve accepting that perceptual experience involves a type of representation. So Noë and O'Regan have to make it clear that what the enactive approach rejects is that current perceptual experience is constituted by a current awareness of (rich) mental phenomena. When attacking representational accounts of perception they have in mind the type of theory that supposes that perceptual experience involves a "Cartesian Theatre" type arrangement going on inside one's skull. But even though they are not so extreme as to deny that the brain plays its role (whatever that might be) in perceptual experience, they never actually go into much detail as to what that might be. These states of the nervous system, these *representations*, seem to fit the bill for the type of role that the brain could play on their account. They do not deny that we can form mental representations of objects, but only that perceptual experience is constituted by awareness of such things. The representation of expected stimulation found in taste is not experienced as the perception of a taste until the taste buds come into contact with it. This fits well with the basic intuition of the enactive approach that we experience aspects of the world, not mental representations. What we find here is that the representation affects the perception but does not constitute it.

Accepting this proposal also has additional explanatory power. Firstly it can explain why the same perceptual experience can seem different at different times. For

example, it can explain why sometimes the same flavourant can taste more or less intense. This means that the enactive approach could explain how the same sensory stimulation can cause qualitatively different perceptual experiences.

Under this sort of proposal a shift of attention amounts to the shift of focus from attended to unattended sensory stimulation. For example, when you stop responding to the visual stimulation from the table to look out the window, or when you stop listening to someone's voice and focus on the fan in the background. To accept this is not to accept that such mental representations constitute perceptual experience entirely. We are constantly bombarded with unexpected sensory stimulation, so arguably in such cases what you might expect plays little or no role. When you look around quickly you might not know exactly what to expect, but you might also have a vague idea. So representations may inform your looking activities in some way. And when you are looking for something, it does sometimes seem to "pop-out" at you when you do spot it, so perhaps this could be explained by an expectancy or attunement to that sensory stimulation. The "gateway" mechanism in the experience of pain also seems to function in the same way.[157] If the role of mental representation can be thought of in this way then it can fit under the enactive approach to perception. The way that the claim that perception is a skill, or is constituted by our understanding (practical knowledge) of movement-related sensorimotor contingencies, is often fleshed out by Noë and O'Regan is in terms of the organisms' attunement to environmental detail. Accepting this sort of representational proposal is one way, and I believe the best way, to provide a satisfactory account of what such attunement consists of.

3.8 Back to Vision and Touch

Allowing a role for this particular type of representational process as a constitutive component of perceptual experience also delivers added explanatory

[157] Murat Aydede, "Pain: New Essays on Its Nature and the Methodology of Its Study," (Cambridge MA: Bradford Book/MIT Pr, 2005).

strength to the enactive approach as well as providing it with the capacity to incorporate new developments in empirical research.

The content of perceptual experience, whatever it may be, is essentially an hypothesis or conclusion that the perceiver derives from current sensory stimulation. Or what Noë refers to as “virtual content”. As I have shown, taste and other modes of perceptual experience the possible outcomes – content – of perceptual experience is dependent upon current states of the perceptual system. Empirical research has shown that similar processes are involved in visual perception.

Suzuki and Grabowecky found evidence of this while examining “perceptual bistability”. Well-known examples of this phenomenon include the Necker cube and Rubin’s face-vase image.[158] In their experiments subjects were presented with two different images dichoptically (i.e. one image presented to each eye). The particular images where designed in such a way that, being related and/or opposing in terms of their shape, would allow for four possible perceptual outcomes. The resulting spontaneous perceptual experience/content for a given individual is dependent upon whether the individual subject possesses left, right or mixed-eye dominant visual perception. What they found was that, dependent upon eye dominance, individual subjects would experience alternating perceptions of one pair of the possible set of four percepts. In other words, they experienced shifts from one shape to another, then back to the first, just as one can see the face then the vase and back to face (in Rubin’s image) but did not “shift” to either of the other two possible shapes. The particular pair that is perceived for an individual is dependant upon which type of eye dominance the subject possesses. Suzuki and Grabowecky call this phenomenon “perceptual trapping.”[159] Although the subjects in these experiments are free to explore all (four) of the equally valid interpretations of the presented stimulus their actual experienced becomes trapped between two opposing interpretations of the stimulus. The

[158] Satoru Suzuki and Marcia Grabowecky, "Evidence for Perceptual "Trapping" and Adaptation in Multistable Binocular Rivalry," *Neuron* 36, no. 1 (2002): p. 143.
[159] Suzuki and Grabowecky, "Evidence for Perceptual "Trapping" and Adaptation in Multistable Binocular Rivalry," p. 146.

neurological explanation of this phenomenon is that once a particular neural network, which encodes opposing perceptual features, is activated the subject is able to switch between these two (opposing) interpretations of the stimulus spontaneously and automatically at the expense of being able to switch to either of the other two possible interpretations of the stimulus. Suzuki and Grabowecky also discovered that over time one of the images/interpretations that a subject is trapped between tended to dominate as the subject adapted to the ongoing perceptual experience.[160] In other words, the subject would perceive one of the pair of opposing interpretations for longer periods of time, switching to the other interpretation for shorter periods.

Obviously the subjects in this experiment are perceiving certain images in a controlled situation that would not normally be encountered. However the shapes used (triangles, diamonds, hourglass-shapes etc.) are not particularly unusual in themselves. The subjects in these experiments become trapped between two possible outcomes that are related in so far as they are opposing images in terms of one or another feature such as convexity, concavity, taper or skew and so on. It is not implausible to suggest that we may ordinarily encounter visual stimuli that allow for more than one interpretation. The perception of colour seems to me to be a legitimate candidate. People often dispute the exact colour of a thing, which may of course be due to individual colour-vision abnormalities. If nothing else these experiments show that the qualitative content of (current and future) visual perception is (at least in part) dependent upon the current state of visual system just as it is in other perceptual modalities. These experiments also suggest that the ability to switch between perceptual interpretations, that is, the ability to perceive a particular shape, is also dependent upon inhibitory or excitatory signals carried by neural networks[161] (or nervous fibres), as it is in other modalities. Given that the possible interpretations of such stimuli are dependent upon the currently active neural network, which is expressed qualitatively within a limited range of possibilities that can be described in

[160] Suzuki and Grabowecky, "Evidence for Perceptual "Trapping" and Adaptation in Multistable Binocular Rivalry," pp. 149-51.
[161] Suzuki and Grabowecky, "Evidence for Perceptual "Trapping" and Adaptation in Multistable Binocular Rivalry," p. 154.

representational terms, then it is further evidence that there is a kind of representational process involved in visual perception.

But just as I have argued in the case of the "other" perceptual modalities, it is not all bad news for an enactive/sensorimotor account of perception. In fact, incorporating these features into an enactive/sensorimotor thesis can only add to its explanatory power. Understanding how these types of phenomena unfold demonstrates how the activated neuronal network/s integrate with other mechanisms or systems within the brain in the activity of perceptual experience. In the visual experimental situation described above we can see how, for example, an activated "representation" of convex shape or features "might facilitate dominance of the diamond shape by enhancing the group of edge detectors responding to diamond contours such that those contours gain dominance in local rivalry."[162] In other words it is evidence of apparatus dependent sensorimotor contingencies that can be described in representational terms. The fact that subjects can adapt to even these somewhat extreme experimental conditions is also encouraging or supportive for an enactive/sensorimotor approach in that it shows that we are able to exert some control over which particular interpretation we make of a given stimulus. In other words, we exercise certain skills, or discriminatory capacities, as part of the activity of perceptual experience. These experiments support other evidence that the interpretation of ambiguous stimuli is assisted by or even steered by "high-level, executive centres in a kind of perceptual 'exploration'."[163]

Phenomenological reflection on the experience of viewing (deliberately) ambiguous figures such as Necker cubes also supports the conclusion that we have, or can learn to have, the ability to interpret such figures in a manner that is under one's control. In such cases in which one has not viewed the particular image before one may find themselves "trapped" in a particular interpretation of it until one has learnt or discovered

[162] Suzuki and Grabowecky, "Evidence for Perceptual "Trapping" and Adaptation in Multistable Binocular Rivalry," p. 154.
[163] D. A. Leopold, "Visual Perception: Shaping What We See," *Current Biology* 13, no. 1 (2003): p. R11.

the other possible interpretation/s, after which time one can switch between interpretations. In short, although the suggestion that specific representational neural encoding underlies perceptual experience goes against part of the doctrine of Noë and O'Regan's enactive account of perceptual experience, accepting the existence of representational neural encoding can be incorporated into a sensorimotor account of perception in a way that does not undermine other enlightening features of this approach and can add to the explanatory power of the sensorimotor thesis in a way that sheds some light on what is meant by terminology such as "apparatus-dependent sensorimotor contingencies." However, it is important to bear in mind that:

> Perceptual trapping demonstrates that even when the brain is given great freedom to interpret its sensory inputs, it does not wander randomly through solutions, nor does it seek them based upon abstract or semantic properties of stimuli. Instead, it appears to be bound by principles stemming directly from the underlying neural encoding scheme — in this case the opponent coding of global shape.[164]

Although I cannot point to any empirical evidence of support, it does not seem entirely unreasonable that similar processes underlie tactile perception. Given that they are a part of other modes of perception it would be rather surprising if it were not the case. It may simply be the case that it is rather more difficult to observe this process in action as tactile perception is generally thought of in terms of the perception of solid shapes/objects which perhaps do not allow for multiple interpretations under normal circumstances. However, re-calling Noë and O'Regan's own example of the "guessing game" in which one cannot see the object one is asked to identify shows that at least in some circumstances tactile perception does involve a process of *hypothesis testing*. In order for such a game to work it must be possible for the player to misidentify the object, or *misinterpretate* sensory stimulus, at least initially. Upon identifying an object, certain inhibitory or excitatory signals may come into play, which may assist or inhibit further exploratory actions. Indeed, identifying an object, or settling on a possible

[164] Leopold, "Visual Perception: Shaping What We See," p. R11.

interpretation may guide such exploratory actions. Under normal circumstances, when feeling an object to determine particular properties of it, excitatory or inhibitory signals may factor in the determination or discrimination of certain features such as, for example: the roughness/smoothness, temperature or perhaps even size and shape, of an object. When seeking to determine such features to a more exacting degree such inhibitory or excitatory signals may effect the qualitative expression of the perceptual experience. Again, if such representational processes are involved this does demand that amendments be made to the enactive thesis, but in a way that I believe can only be beneficial to our overall understanding of perceptual experience.

3.9 Conclusion

In conclusion, there are two ways that the enactive approach can go when it comes to the sensory modalities other than vision and touch. An enactivist could simply bite the bullet and say that Noë and O'Regan were a little rash to claim that it can apply to all the senses and accept that it simply does not apply to them all.

But given that there is plenty of reason to suggest that our implicit knowledge of sensorimotor contingencies play some role in all sorts of perceptual experience then there is no reason to not use it as a useful explanatory approach for many if not all (or at least most types of) perceptual experiences.

But to do so, some of the claims of the enactive approach must be modified.

Firstly, touch is not the (best) paradigm for understanding all perceptual experience. Touch may be a very useful paradigm for understanding many aspects of perceptual experience, e.g. spatial, but it does not necessarily provide the best paradigm for understanding all perceptual experience.

In a similar vein, colour should not be considered as the paradigmatic way to understand the qualitative aspects of all the perceptual modalities. The fact colour perception is debated by cognitive scientists in terms of labelled-line vs. across fibre pattern coding,[165] as it is with taste and olfaction, may have led Noë to believe that there are enough similarities between them that would indicate that an explanation for one would easily translate to the others. Although, as usual, Noë does not give us any reason why he assumes colours to be paradigmatic for qualitative aspects of perception. But as with touch, it appears that Noë is mistaken.

Lycan argues that the reason why smell (and, I would add, taste) have been so misunderstood by philosophers and others is that the *philosophy of science* is almost exclusively the philosophy of physics, whereas the *philosophy of biology* is "contaminated by politics."[166] Lycan argues that chemistry, and/or the *philosophy of chemistry* – that is, *classical* chemistry, rather than physics masquerading as chemistry – has been largely ignored, indeed "slighted", as Lycan argues. Gustation and Olfaction, as I have discussed in this chapter, are most definitely *chemical* senses. That is, in these cases the perceptual process constitutively involves chemical reactions and the (qualitative) perception of chemical properties. So it would seem that we are in a situation in which many theorists have attempted to explain "chemical-sensory" perceptual experiences in terms of theories that are structured or based in theories of the movement and interaction of bodies and energies that follow the laws of physics. Physics may lead to good explanations of phenomena that are inherently spatial, but that does not entail that such explanations will suit phenomena that are inherently chemical. Perhaps, with greater understanding of (the philosophy of) chemistry, we can come to a better and more accurate understanding of these "chemical senses." And not only will we come to have a clearer understanding of the perceptual process/es involved in these modalities but perhaps also sensory/perceptual experience as a

[165] Gilles Laurent, "Olfactory Network Dynamics and the Coding of Multidimensional Signals," *Neuroscience* 3 (2002): p. 891.
[166] William G. Lycan, ""the Slighting of Smell (with a Brief Word on the Slighting of Chemistry)"," in *Of Minds and Molecules: New Philosophical Perspectives on Chemistry*, ed. Nalini Bhushan (New York: Oxford University Press, 2000), pp. 283-84.

whole, on account of the fact that the brain and the nervous system is simply a massive and complicated electro-*chemical* system.

Secondly, perception is not constituted by our understanding (practical knowledge) of movement-related sensorimotor contingencies alone. At least, not in the way that Noë and O'Regan explain the role of knowledge of sensorimotor contingencies. As we have seen there are other plausible ways to explain some perceptual experiences that do not specifically involve movement-related sensorimotor contingencies. Noë seems to accept that this is a possibility himself in a recent article that I quoted at the beginning of this chapter and is worth repeating:

> For it is an open question, an empirical question, whether the content and character of the sorts of perceptual experiences we actually enjoy are controlled by our sensorimotor expectations *alone*.[167]

Perhaps the best way forward for the enactive approach is to emphasise the motor-contingencies aspect of the approach; the aspect that discusses the way that the perceptual modalities expect to receive certain types of sensory stimulation in certain circumstances. In this way it seems possible to explain perceptual experience in terms of motor-expectancies that we both have control over as well as the ones that we do not, which means that the enactive approach can explain perceptual experiences by allowing other types of mental expectations to play a role, i.e. those expectancies formed in conjunction with our memory.

Thirdly, the enactive approach, in my opinion, should embrace the possibility that not all perceptual experience involves dual content. As discussed above Noë at least seems happy enough to accept this and, as I discussed, accepting this means that the enactive approach can cover a wider range of experiences. Accepting this also gives the enactive approach a way to explain how different types of sensory stimulation, sometimes from different modalities, can be co-constitutive of different

[167] Noë, "Experience without the Head," p. 429. Emphasis in the original.

types of perceptual experience. “Conscious” perceptual experience may be the best way to understand perceptual experience that involves both types of content as Noë himself suggests towards the end of *Action in Perception*.

And finally, the enactivist must be clear about what exactly they are rejecting when they reject mental representations. Clearly there is some role played by neural-networks, that is by mental states, which I have argued constitute a form of representation and which many others, particularly scientists, have no qualms about referring to as representational in a particular use of the term. As I have argued, accepting that such types of mental representation play a constitutive role in perceptual experience only adds to the explanatory power of the enactive approach. It also helps to give some meaning to what Noë refers to as “virtual content” when he describes the character of perceptual content, which I will elaborate on in the next chapter.

Furthermore, accepting such a proposal bolsters a sensorimotor account of the distinction between the modalities, and, conceivably adds further explanatory power to a sensorimotor approach in that it provides a means to explain how at different times the *exact same* sensory stimulation can give rise to (qualitatively) different perceptual experiences. Also, as I will discuss in the next chapter, accepting this proposal also adds strength to the claims made by sensorimotor theories in regards to phenomena such as change/inattentional-blindness. A further consequence of these conclusions is that the enactive/sensorimotor account of vision and touch will also have to be amended to include these new insights, and this is, I believe, not only possible but actually an improvement in the understanding and explanatory power of this approach.

4 Action *and* Perception: The way to make sense of the (Enactive) Sensorimotor Approach to Perception.

The whole difficulty of the problem that occupies us comes from the fact that we imagine perception to be a kind of photographic view of things, taken from a fixed point by that special apparatus which is called an organ of perception – a photograph which would be developed in the brain-matter by some unknown chemical and psychical process of elaboration. But is it not obvious that the photograph, if photograph there be, is already taken, already developed in the very heart of things and at all the points of space? No metaphysics, no physics even, can escape this conclusion. Build the universe with atoms: each of them is subject to the action, variable in quantity and quality according to the distance, exerted on it by all material atoms. Bring in Faraday's centres of force: the lines of force emitted in every direction from every centre bring to bear upon each the influences of the whole material world. Call up the Leibnizian monads: each is the mirror of the universe. All philosophers, then, agree on this point. Only if when we consider any other given place in the universe we can regard the action of all matter as passing through it without resistance and without loss, and the photograph of the whole as translucent: here there is wanting behind the plate and black screen on which the images could be shown. Our 'zones of indetermination' play in some sort the part of the screen. They add nothing to what is there; they effect merely this: that the real action passes through, the virtual action remains.

- Henri Bergson, *Matter and Memory*, (1896/1911)

4.1 Introduction: Looking backwards in order to see the way forward.

Noë and O'Regan, in explaining the sensorimotor approach to understanding perceptual experience, present this approach as one that is inspired by the works of Merleau-Ponty and phenomenology in general. Indeed the two main goals of this approach, is that it be a "phenomenologically apt" as well as "explanatorily adequate".[168] However the problem/s that many have with this approach is that it fails to do justice to the actual phenomenology of experience, particularly visual experience. At times the explanations provided by this sensorimotor approach to vision do not seem to provide a satisfying account of perceptual experience. This is a concern that Noë himself shares in the conclusion of *Action in Perception*:

> The main problem with this strategy, I now believe, is that we purchased noncircularity and explanatory power at the expense of phenomenological aptness.[169]

Noë attempts to get around this concern by appealing to an evolutionist perspective, by arguing that our perceptual capacities are simply massively more complicated systems than those of the simplest organisms. But it is not clear how this appeal is supposed to overcome the phenomenological concern.

Perhaps the major motivation behind the sensorimotor approach to vision is to respond to the conception that perception involves, constitutively, the production and use of (representational) mental imagery – which Noë refers to as "the Snapshot Conception." In light of this, Noë takes the reader of *Action in Perception* through the history of this idea to demonstrate how it came to be accepted and the contributions made to its development by everyone from Plato and Aristotle, Al-Kindi and Alhazen (Ibn Haythem), Kepler and Descartes, and finally, Mach. In short, the snapshot conception of visual experience is an attempt to explain how our physical bodies can "capture" details (sensory data) of the world and "translate" it into the image/s of the world that we perceive. The problem is, however, that experimental evidence and

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[168] Noë, *Action in Perception* pp. 225-26.
[169] Noë, *Action in Perception* p. 228.

phenomenological reflection demonstrates quite clearly that we do not, in fact, perceive the world in this way. Experiments and reflection reveal our perceptual apparatus and experience to be significantly "flawed" by comparison to photographic images. In response to this problem many theorists have come up with various explanations, such as the idea that the brain some how "fills-in" the missing information, which raise all sorts of other problems. The mistake made by such theorists is that they are attempting to explain how the brain can overcome such defects to produce such images, when in fact no such image is produced at all.

The major hurdle in overcoming "snapshot" conceptions (and perhaps the reason why they remain intuitively plausible for many) is that, in spite of everything we may know, visual experience does *seem*, to a certain degree, to present the world in such detail that, at the very least, it seems *as if* we take "snapshot-images" of the world. In rejecting this notion, Noë attempts to convince us that it does not seem this way to us, and, that we do not see the world in such detail. It is simple to demonstrate that we do not see the world in such detail but it is not so easy to convince everybody that it does not seem like this to a degree. This is where Noë's account of perceptual experience becomes confused and loses its grip on phenomenological aptness. In attempting to overcome this difficulty Noë at times demands that we accept a very minimalist position with regards to the content of perceptual experience, that we accept that the fact that experience seems to be detailed is simply a result of our sensorimotor connection to the world, and, the fact that we can access environmental detail visually at great speed makes it *seem* like the information/content was already a part of the experience. No doubt the speed with which we access visual information and the sensorimotor connection we have to it play a role in supporting this supposition. However it is the minimalist conception of perceptual content that has caused many to baulk at this explanation of experience. As I discussed in Chapter 2, according to Noë, when we are looking at, for example, a tomato, we do not even see all at once every part of the side of the tomato that is facing us. And yet, to a degree, it does *seem* as if we do. As it stands, the enactive approach to vision does not have a good account as

to why, even though at times it seems to be trying to explain this feeling. The real problem here is that Noë tries to explain why vision seems like something that it is not without giving a good account of what it really does seem like.

What I find most surprising then, is why Noë does not use the resources of phenomenology in order to explain what vision actually seems like in order to provide a phenomenologically apt sensorimotor account of the contents of perceptual experience. Given that Noë acknowledges his debt and allegiance to the phenomenological tradition it is all the more surprising that nowhere in any of his work is there an attempt to engage with the work of Bergson, who, roughly a century ago, was already describing perception in terms of action, virtual images and sensorimotor relations.[170]

In this chapter I will use the resources of Bergson's account of perception to explain how, in conjunction with the modifications I have argued for in the previous chapters, it is possible provide a "phenomenologically apt" enactive or sensorimotor account of perceptual experience. In order to demonstrate that it does so I will then discuss how understanding perception from this perspective (through a sensorimotor approach) can provide a satisfying response to the kinds of phenomena (e.g. change-blindness) that have both motivated the enactive/sensorimotor approach and criticism of it.

4.2 Bergson and Noë: Virtual Memory and Virtual Content

On the one hand Bergson's account of perception seems to be remarkably similar to Noë's and yet, on the other, the way that Bergson describes perception in terms of images and the role he assigns to memory seem – on the surface – to contrast with

[170] Bergson is referred to in a footnote among other "certain philosophers and scientists" whose work have been used as inspiration in: J. Kevin O'Regan, Erik Myin, and Alva Noë, "Sensorimotor Consciousness Explained (Better) in Terms of 'Corporeality' and 'Alerting Capacity'," *Phenomenology and the Cognitive Sciences* 4 (2005). This is the only reference to him in all their work that I am aware of except for the acknowledgement that one of the later commentators (Stephen E. Robbins, "Virtual Action: O'regan and Noe Meet Bergson," *Behavioral and Brain Sciences* 27, no. 6 (2004).) on their 2001 BBS paper mentioned that he saw some similarities.

Noë's enactive account. In the passage quoted at the start of this chapter it is obvious that both reject the idea that perception is like a photograph, both conceive of perception in connection with action and both conceive of perception as "virtual" in some way. Also, as I will discuss, they both conceive of perceptual experience as, at least partly, constituted by embodied and practical knowledge. The differences are that Bergson discusses the role that this sort of knowledge plays and its derivation from memory, whereas in Noë it takes the form of an abstract body of knowledge in itself (i.e. knowledge of sensorimotor contingencies). Bergson also, by paying close attention to the actual phenomenology of experience as it unfolds through time, provides an account of how we come to experience the whole of the environment in the way that it *seems* that we do; and as such can satisfy some of the phenomenological and other problems with Noë and O'Regan's version of the enactive sensorimotor approach.

Noë and O'Regan persistently attack a representationalist theory of vision, the "snapshot conception", and do not consider types of representational theories. But it is not clear that there is any currently working theorist who holds this "snapshot conception" type of view. They target a straw man, and as such never engage the concerns of representationalism head-on nor develop a satisfactory account of the phenomenology of visual experience. Noë argues that the (phenomenological) differences between dream experiences and perceptual experience can be explained by his account in this way:

> The biggest difference, phenomenologically speaking, has to do with detail and stability. Dream sequences tend to be poor in detail, and what detail there is tends to vary unstably across scenes. Perhaps this is explained by the fact that, as a neuroscientific matter, the brain is not very good at storing detailed representations of scenes. In normal perception, there is no need to store detail, since the world is available to serve as a repository of information about itself. This suggests a hypothesis: Dream states are unstable and poor in detail precisely because dream states, unlike normal, non-dream perceptual states, *are* produced by neural activity alone. Actual

> perceptual consciousness is anchored by the fact that we interact with, refer to, and have access to the environment. The stability of the environment is what gives our experiences their familiar stability.[171]

For Noë then, the only phenomenological differences between a dream and a "normal, non-dream" perceptual state are differences in degree of detail and stability. And yet, as I have discussed, Noë does not take normal visual experience to consist of very much detail at all. If one cannot see even the whole of the facing side of a tomato, then I am sure that most would agree that dreams at least seem to be as detailed as that (at least some of the time). That only leaves stability. The enactive/sensorimotor-contingency theory does give a plausible way of understanding the stability of "normal" perceptual experience via its explanation of real-time sensorimotor engagement with the environment. But this does not explain in what sense normal perceptual experiences and dream experiences are the same. It does not explain in what sense perceptual states and dream states are the same. Dreams and perceptual experience both *seem to be image-like* in some sense of the term. The enactive/sensorimotor contingency theory does not give a plausible account of why.

Bergson explains that the similarity between dreams and (what we take to be the contents of) perception derives from the fact that both are constituted by using the resources of memory. The difference between the two, is that they use memory in a different way. Bergson holds that there are two types of remembering; a "representation" or "recollective" memory, that corresponds to what Tulving termed "episodic" memory; and, another type which Bergson calls "habit" memory. As with Tulving's episodic memory Bergson's "recollection" memory is the type of memory that, in a sense, stores "memory-images" of past events that situate such (memories of) events within a past time and place. Habit memory on the hand, is the type of memory that "stores" the practical knowledge or know-how of how to perform a particular task. Bergson describes the difference between the two as being the difference between re-membering (recollecting) the actual event of sitting down and learning a lesson and the

[171] Noë, *Action in Perception* p. 214. Emphasis in the original.

ability to re-create the procedures learnt to reproduce the outcome of the lesson.[172] For example, it is the difference between remembering the particular occasion/s of taking guitar lessons and the ability to (remember how to) play *Stairway to Heaven*.

Both these forms of memory call upon the same (memory/ies of the) past in order to produce either the memory of the event or the (memory of the) ability. It must be stressed that in the process of remembering how to perform an activity at no time does the memory of past events enter into consciousness in the form of memory-images. The memories of the past that are called upon in the process of re-membering are derived from a heterogeneous source of memory, which he refers to as "virtual memory." This source of virtual memory is functionally identical to the type unconsciousness that Freud refers to as the "pre-conscious."[173] In this sense then, the contents of virtual memory are "pre-conscious" in that they are available to consciousness in the future or may have been accessed in the past. Virtual memory encodes information as sensorimotor routines that can become actualised through action or through our capacities to remember or imagine.[174] Both episodic and habitual memory, according to Bergson, draw on this virtual memory in order to engage in the process of remembering. Importantly, both constitute processes whereby virtual data is called upon for a purpose. The virtual memory does not store such data in the form of images. Episodic memory is itself a system which creates or generates such "images", rather than existing as a storehouse of images, according to Bergson:

> In fact, this is just what consciousness bears witness to whenever, in order to analyze memory, it follows the movement of memory at work. Whenever we are trying to recover a recollection to call up some period of our history, we become conscious of an act *sui generis* by which we detach ourselves from the present in order to replace ourselves, first, in the past in general, then in a certain region of the past—a work of adjustment, something like

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[172] Henri Bergson, *Matter and Memory*, trans. Nancy Margaret Paul and W. Scott Palmer (London: Allen and Unwin, 1911/1962) pp. 88-89.
[173] Sigmund Freud, *The Essentials of Psycho-Analysis*, trans. James Strachey (London: Penguin) pp.442ff.
[174] Bergson, *Matter and Memory* pp. 168-69.

> the focusing of a camera. But our recollection still remains virtual; we simply prepare ourselves to receive it by adopting the appropriate attitude. Little by little, it comes into view like a condensing cloud; from the virtual state it passes into the actual; and as its outlines become more distinct and its surface takes on color, it tends to imitate perception. But it remains attached to the past by its deepest roots; and if, when once realized, it did not retain something of its virtuality, if, being a present state, it were not also something which stands out distinct from the present, we should never know it for a memory.[175]

This passage reveals and demonstrates that we should not confuse any imagery associated with memory as constituting what remembering is in itself. Re-membering is a process which in some cases (recollection), leads to the generation of memory-images that are available to consciousness. The memory-images themselves are neither the cause nor the entirety of the process. In order to recollect in this way one must consciously focus on the past and *consciously* re-construct such mental images out of virtual memory.

Dreams and imagining are therefore similar to episodic memory in that they all consist of mental imagery that is formed out of this virtual memory. The difference between them is that in the case of (episodic) memory one is in control of which components of virtual memory are required or of interest. Thus (according to Bergson) dreams are phenomenologically different to episodic memory and imagination because we are not in control of which aspects of virtual memory are transformed into mental imagery rather than the fact that we do not have access to environmental detail as Noë argues. Noë argues that dreams are unstable simply because dream states are produced by neural activity alone, but episodic memory and imagination shows that neural activity is at least capable of producing stable imagery.

[175] Bergson, *Matter and Memory* p. 171.

Noë argues that when we perceive, we do so without the use of mental imagery/representations. And yet, dreams and other types of mental *image-ination* clearly demonstrate that we have the ability to (re-)construct mental images with a certain amount of detail. Noë argues that the content of perception is what he refers to as virtual content. The description of it offered by Noë sounds like an image of some form, even if it does not encompass one side of a tomato, still exists as a kind of image, namely the image of *some-of-one-side-of-a-tomato*. But this is precisely what Noë argues we do not make use of during perceptual experience. In his exposition and use of the term "virtual content" Noë confounds the entire notion of non-representational perception with a representational image – the virtual content itself. In trying to describe the content of a perception (as virtual content) Noë describes it as a type of non-detailed image which thus leads to confusion. Bergson, on the other hand, argues that any such image is never a representation of current sensory stimulation but a recollection of past stimulation which can be achieved by disengagement from sensory stimulation in order to produce such a mental image.[176] In Bergson, such mental imagery can only ever be of the past. In order to understand how Bergson conceives of perception one must understand the way that Bergson conceives of the relation between perception, memory and time.

With regards to the phenomenology of episodic memory I feel that Bergson has got it absolutely right. When I try to remember a past event I will first try to *imagine* a particular person, object or place and then; as the (mental) image becomes somewhat clearer, other images will form in succession or in "*snapshots*" of an evening or event. Clearly everyone has these sorts of experiences of recollection. I also find when I close my eyes and try to imagine a particular object, e.g. what a particular person looks like or an abstract shape or prism, at the process is very similar. The image starts forming at one point and once some of detail has been recognised the image is seemingly under my control. For example, details of a face might be "focussed" on, or a prism can be "mentally rotated." Similarly I have noticed that when I am in a state of what I might

[176] John Mullarkey, *Bergson and Philosophy* (Edinburgh: Edinburgh University Press, 1999) p. 49ff.

refer to as “semi-sleep” – where one is almost asleep or slipping in and out of a deep sleep – mental images form seemingly of their own volition, and on reflection have some connection with a half-remembered dream. It is not unlike when one is remembering (i.e. recollecting) and another (often related) image forms unintentionally. Recollection, imagination and dreaming share a similar phenomenology. The images that accompany these experiences are not necessarily detailed or necessarily stable. Bergson argues that this aspect of them explains why we do not confuse them for perception itself.[177] Whatever else might distinguish them from “normal” perceptual experience it is obvious that we do not take perception to be these sorts of experience.

When Noë attempts to describe the content or phenomenology of a moment of experience (as virtual content) he tries to accurately the describe the miniscule amount of raw sensory experience that he imagines one would or could experience (based on his reading of the scientific data) and ends up describing an image, a snapshot, which has very little detail whatsoever. In doing so, Noë is trying to describe a moment of experience that has already passed. Common logic dictates that one cannot both experience an instant and describe it at the same time. What Noë actually does; using his knowledge of the workings of the eye, brain etc., is *imagine* what a singular micro-second of experience would be like, and therefore he ends up describing to us a moment of his own imagination – in this case a small percentage of the facing side of a tomato.[178] Noë’s conception of virtual content fails to correctly describe people’s actual perceptual experiences because people do not experience any such images at all but rather, as Noë and O’Regan stress, we experience an ongoing engagement with the world. Bergson argues that any attempt to accurately describe any moment of perception is set to fail for the very reason that perception itself is not a series of discreet moments:

> Pure perception, in fact, however rapid we suppose it to be, occupies a certain depth of duration, so that our successive perceptions are never the real moment of things, as we have hitherto supposed, but are moments of

[177] Bergson, *Matter and Memory* pp. 201ff.
[178] Noë, *Action in Perception* pp. 134-35.

> our consciousness. Theoretically, we said, the part played by consciousness in external perception would be to join together, by the continuous thread of memory, instantaneous visions of the real. But, in fact, there is nothing for us that is instantaneous. In all that goes by that name there is already some work of our memory… which prolongs into each other, so as to grasp them in one relatively simple intuition, an endless number of moments of an endlessly divisible time.[179]

Our perceptual experience of the world and indeed our perceptual experience of time itself (as it unfolds) does not unfold as a series of instantaneous moments. This is what gives it its unique translucency that makes it so difficult to explain. We can never *capture* a unique, singular and indivisible moment of perception because no such moment exists. When we try, as Noë does, we fail and end up recollecting or *imagining* a moment of consciousness, such as a small section of a tomato.

Noë does, to be fair, seem to realise this. Having suggested that a singular moment of visual perception could be described in terms of how much of an object the retina can foveate at any given moment he concedes that even such a description fails to properly account for the phenomenology of (conscious) experience:

> What this shows is that you cannot factor experience into an occurrent
> and a merely potential part. Pick any candidate for the occurrent factor.
> Now consider it. It is too structured; it too has hidden facets or aspects.
> It is present only in potential.[180]

Elsewhere, Noë introduces the term “Virtual Content” by using the analogy of downloading content (e.g. the *New York Times*) onto one’s computer, thereby making this content “virtually present”. But, as Noë realises above, there are no such images that are comparable to what a computer both projects and (at least temporarily) stores. Therefore, whatever perception may be, it cannot be (solely) constituted as virtual content alone in the way that Noë describes.

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[179] Bergson, *Matter and Memory* pp. 75-76.
[180] Noë, *Action in Perception* p. 217.

4.3 Virtual Content, Virtual Action and Time

Noë uses the term “virtual content”. Bergson uses the term “virtual action”. As I will explain, both these terms are intended to refer to the same sort of experience, that is, currently occurrent perceptual experience. “Virtual content” and “virtual action” are both constituted through sensorimotor relationships and engagement with the environment. Understanding the sensorimotor relationships a creature (such as ourselves) has with the environment (in abstract terms) does not, however, provide an answer that speaks to the phenomenology of experience. Phenomenological reflection suggests that perceptual experience is both more detailed and more “image-like” than such an account suggests. Noë and Bergson both see the explanation of the phenomenology of experience as being explained by the perceiver’s ongoing perceptual activity over time. Bergson, I will show, pays closer attention to the temporal character of (perceptual) experience and provides an overall more satisfying account of the phenomenal character of perceptual experience. In this section I will also show that if we take the terms used by Bergson and Noë; and define a role for each, then; in conjunction with a Bergsonian understanding of temporal extension and the role of sensorimotor knowledge we will have a phenomenologically apt description of perceptual experience.

Briefly; Noë and O’Regan explain the phenomenology of experience through temporal extension by arguing that our visual access to environmental features is so fast that we *feel* as if we have access to the entire visual field because we can access any detail we wish seemingly instantaneously. Metaphorically it is similar to the way that a film moves too fast for us to notice each frame, which explains (according to Noë and O’Regan) why phenomena such as change-blindness normally goes undetected. As I discussed in Chapter 2, Noë argues that the feeling we have of the presence of such rich detail is because such detail is a form of “presence in absence” constituted of virtual content. Virtual content is, in turn, constituted by our (practical) knowledge of

sensorimotor contingencies. That which is present in this way are those aspects of the environment that interest us at the time. One of the conclusions I came to in chapter 2 is that, (in order make sense of and to account for certain experiences) Noë and O'Regan must, and indeed do, concede that some sort of storage mechanism is involved. However, Noë and O'Regan do not discuss what role such a storage system would play and their account of the role of our knowledge of sensorimotor contingencies raises certain problems. In Bergson's account virtual memory functions as this storage system.

Bergson also argues that the phenomenology of experience is explained by its temporal extension, but not in the same way. The fundamental difference between the two is in Bergsons' understanding of (and attention to) the nature of time and perceptual experience. Not only did Bergson consider perceptual experience to be temporally extended, but time itself, or rather, our experience of time is itself extended. Noë and O'Regan tend to attempt to explain the (visual) content of occurrent experience in a "minimal" way by conceiving of "now" or the "present" as very miniscule time slices (that are at least no longer than a visual saccade). Bergson argues that what we think of as the "present" is difficult to define:

> Our consciousness tells us that when we speak of our present we are thinking of a certain interval of duration. What duration? It is impossible to fix it exactly, as it is something rather elusive. My present, at this moment, is this sentence I am pronouncing. But it is so because I want to limit the field of my attention to my sentence. This attention is something that can be made longer or shorter, like the interval between two points on a compass… an attention that could be extended indefinitely would embrace, along with the preceding sentence, all the anterior phrases of the lecture and the events which preceded the lecture, and as large a portion of what we call our past as desired. The distinction we make between our present and past is therefore, if not arbituary, at least relative to the extent of the field which our attention can embrace… As soon as this particular

> attention drops any part of what it held beneath its gaze, immediately that portion of the present becomes *ipso facto* a part of the past.[181]

The present is difficult to define because we can, at least theoretically, always conceive of a "present" that is shorter or longer than what we might currently have in mind. Time, as we experience it, is not a series of successive moments but rather a notion relative to the amount of things that we can or choose to pay attention to.

Bergson also argues that our sensorimotor relationship with the world underwrites our perceptual experience. However Bergson does not think of this relationship in quite the same way. Bergson thinks of this relationship as one that reveals the world to us in terms of the possible actions of the objects and the possible actions that would be required on our part in order to interact with objects of interest. As these actions need only be possible, Bergson describes them as "virtual actions" which can be retained by memory and, in a sense, override whatever perception/sensation we might have of our own actual movement:

> If we suppose an extended *continuum*, and, in this *continuum*, the centre of real action which is represented by our body, its activity will appear to illuminate all those parts of matter with which at each successive moment it can deal… Everything will happen as if we allowed to filter through us that action of external objects which is real, in order to arrest and retain what is virtual; this virtual action of things upon our body and of our body upon things is our perception itself. But since the excitations which our body receives from surrounding bodies determine unceasingly, within its substance, nascent reactions, - since these internal movements of the cerebral substance thus sketch out at every moment our possible action on things, the brain exactly corresponds to the perception. It is neither its cause, nor its effect, nor in any sense its duplicate: it merely continues it,

[181] Henri Bergson, *The Creative Mind*, trans. Mabelle L. Andison (New York: Greenwood Press, 1968) pp. 178-79.

> the perception being our virtual action and the cerebral state our action already begun.[182]

In other words, according to Bergson, our perceptual state constantly maps out possible virtual action/s which, if we choose to, we can pause and reflect upon but only if we *detach* ourselves from "occurrent" (perceptual) experience.

What this means then, if we take a Bergsonian approach to perceptual experience or content, is that there are effectively two modes of perceptual experience; "real" and "virtual". The distinction between these two types of experience also entails two types of content, real and virtual, that are in turn the product of real and virtual action respectively. On this account "real" perception refers to the type of perceptual experience that occurs in our "normal" non-reflective dealing with the world and "virtual" perception refers to the type of perceptual experience that occurs when we try to reflect upon and/analyse the contents of our perceptual experience. This supports one of the conclusions that I came to in Chapter 2 where I argued that if we are to make sense of the claim that "perceptual experience is constituted by our (practical) knowledge of sensorimotor contingencies" then "actual" perceptual content can only be considered to be that which is derived from the appropriate use of sensorimotor knowledge, i.e. to explore the environment.

[182] Bergson, *Matter and Memory* p. 309.

4.4 Active-Perception and Passive-Perception: The Distinction Explained

The distinction between “real” perception and “virtual” perception is in the role that knowledge of sensorimotor contingencies plays in our experience. The role that they do play is determined by the type and duration of perceptual experience that one is engaged in. As I will explain, the type of experience determines what role virtual memory plays throughout the experience. The duration of the perceptual experience also determines the role that knowledge of sensorimotor contingencies can play, although there may be exceptions to this such as certain bodily perceptual experiences. Both Bergson and Noë argue that perception is constituted by practical knowledge. However Noë ends up describing what I refer to as virtual perception. In what follows I will show how Bergson’s account of the role of sensorimotor knowledge in perception (combined with his understanding of time) can provide a phenomenologically apt account of “real” and virtual perception whereas Noë’s account would be best served as an account of virtual perception. In order to try to avoid confusion I will refer to “real” perception as “active-perception” as this is what truly distinguishes it from “passive-perception” or “virtual-perception”.

As I mentioned above, Noë and O’Regan concede that there must be some sort of memory store for sensorimotor knowledge, but do not explain what role its plays. For Bergson, virtual memory is the storehouse of knowledge of sensorimotor contingencies; and, the particular type of perceptual experience is constituted by the way that virtual memory is used by a perceiver. In perception, memory responds to the present rather than the past:

> [M]emory, laden with the whole of the past, responds to the present state by two simultaneous movements, one of translation, by which it moves in its entirety to meet experience, thus contracting more or less, though without dividing, with a view to action; the other of rotation upon itself, by which it turns towards the situation of the moment, presenting to it that side

> of itself that may prove the most useful. To these varying degrees of contraction correspond the various forms of association by similarity.[183]

Bergson thus provides memory with two roles, surging forward to determine what (possible) actions may be taken and of determining what aspects of memory are best suited to the situation. This determination occurs through a process of "contraction", by which Bergson means that memory will disregard any and all information that is not relevant to the current perceptual experience thus *contracting* or narrowing the range of memory that is utilised in perceptual experience.

4.4 a Active-Perception

Active-perception occurs across continuous time. In this case virtual memory does not create "perception-images." Instead, memory, in this mode of perception follows the movements of the body.[184] In this mode recollective or episodic memory contracts to null and habit memory takes over completely. Habit memory is the know-how to explore the environment and perform actions; which does not require that we *know-what* we are seeing or doing. It does not require that we form mental-images. Habit memory is, essentially, the *practical* knowledge of sensorimotor contingencies that has been learned from previous experience and is called upon by continuously occurrent experience or sensory stimulation. Habit memory is:

> Profoundly different from [recollective memory], always bent upon action, seated in the present and looking only to the future. It has retained from the past only the intelligently coordinated movements which represent the accumulated efforts of the past; and it recovers those past efforts, not in the memory-images which recall them, but in the definite order and systematic character with which the actual movements take place. In truth it no longer *represents* our past to us, it *acts*; and if it still deserves the

[183] Bergson, *Matter and Memory* p. 220.
[184] Bergson, *Matter and Memory* p. 130.

> name of memory, it is not because it conserves bygone images, but because it prolongs their useful effect into the present moment.[185]

Essentially this is identical to the account of how our practical knowledge of sensorimotor contingencies constitute perceptual experience that Noë and O'Regan provide. The advantage of Bergson's version is that he specifically outlines the role that (habit) memory plays in decomposing and recomposing experience as an ongoing activity. The difference is that Bergson's account does not suggest that perceptual experience generates perceptual content, virtual or otherwise, but rather, perception as an ongoing activity – active-perception – generates future actions rather than perceptual images or content.

To understand what is meant by the claim that active-perception generates future actions rather than perceptual images requires careful phenomenological reflection upon actual ongoing active-perceptual experience as well as virtual-perceptual experience. The difficulty in doing so lies in the fact that two types of experience can and do operate simultaneously. I will explain how later but first I will focus on what I call active-perception.

As an example consider the perceptual activity of searching through the house for my keys. During the course of this activity I move through the house, perhaps opening doors along the way, picking up/moving objects, and move my eyes across the rooms and furniture looking for the keys. While I am looking for my keys I obviously negotiate the various obstacles, but I do so automatically, I do not so much *see* the obstacles, rather, I negotiate or navigate my way past them. What I mean is that, although it is true to say that these obstacles *appear* to me in the visual field, I do not actually *see* them in the sense that is often meant when the term "see" is used. "See" is often used to refer to the types of visual experience that Noë refers to as "virtual content" and which, I shall argue constitutes virtual-perception. The error that results from this use of the term is that people assume that all visual experience is the same.

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[185] Bergson, *Matter and Memory* p. 93.

In active-perceptual experience, although I might be specifically *looking* for a particular object, I do not actually *see* the other objects in that I do not consciously take note of any of the details of any of these objects. If asked, I could no doubt remember what some of those objects were, but if I am honest, after the first one or two objects I have to use my ability of recollective (or episodic) memory if I want to recall more objects. It might be said that if I can recall them in this way, then I must have seen them, but the phenomena of change/inattentional blindness clearly demonstrates that this is not necessarily the case. From the moment I begin to recall what objects I might have encountered I begin to mentally construct images of the rooms and fill them with items. It may well be that I am *imagining* or confabulating what I believe I would have seen based on the knowledge I have of the layout and contents of my home, rather than what I actually saw. As I am looking for the keys in my house, I know where everything is, so I can *place* the large pieces of furniture in my recollection or imagination with little or no effort at all. But this does not mean that I saw them as I was looking for the keys. I could just as easily imagine what I would have encountered had I looked in the laundry even though I did not look in that room at all. As for the various pieces of paper, odds and ends, cups and other assorted items that do not stay in one place it is almost impossible to recall exactly where they were with any sort of conviction. Does that mean that in the course of looking for my keys that I did not see them at all? Or perhaps, that I only "half-saw" them, whatever that might mean?

No. In the course of active-perception one does not *see* anything (and possibly everything) that is of not interest within the visual field. One does not consciously take note of anything at all. Active-perception occurs during a continuous period of time and does not pause to reflect on the objects encountered. Having recognised an object as not what you are looking for, active-perception carries on and has no need to use (or store) unnecessary details in order to continue. A magazine will be *seen* (or perceived) only for as long as is necessary to pick it up to look underneath for the keys. A chair will be seen or perceived for as long as it takes to approach and move past it. Later one might be able to recall which colour the magazine and the chair were, and they do

appear as coloured during active-perception, but the colour is not necessarily noticed at the time (as change/inattention-blindness experiments show). Even when I find the keys, I am more likely going to snatch them and stuff them in my pocket rather than stop to notice any details.

Another example of active-perception is the experience of walking or driving a familiar route. In doing so, one can be thinking of a myriad of other things while negotiating other pedestrians or cars and yet, by the end of the journey, be unable to recall very few details of them. In the mode of active-perception, things appear but their appearance is not focussed or reflected upon, rather their appearance generates or provokes more action. Seeing a closed door provokes the action of opening it, seeing a chair provokes a swerve around it, seeing a magazine provokes picking it up. These actions do not (necessarily) lead to further sensory input of the particular objects. These actions are leading towards future actions rather than future perceptions, or indeed current or past perceptions. The goal of all this activity might be to perceptually locate something, but it could just simply be the goal of getting from A to B.

In the mode of active-perception one perceives the environment but only in terms of action. The world and its objects are the stage on which my actions are set and where they unfold over time. As such they are perceived as being in the background, as being peripheral to our goal orientated active-perceptual engagement with the world. In the course of active-perceptual experience our attention is focussed on a particular goal and so our focus is on that which is coming into view rather than that which has already appeared. Or as Bergson puts it; “on that which is unrolling, and not that which is entirely unrolled.”[186] As I said above, habit memory takes over in this mode of perception, and habit memory is *enacted* as practical knowledge. I also said that this type of practical memory was the type of memory that is used when executing an action, such as playing a song, rather than remembering the act of learning how to play it. This form of memory therefore *enacts* as action the sensorimotor ‘schemas’ as

[186] Bergson, *Matter and Memory* p. 194.

described by Piaget.[187] That is to say, that the description of this form of memory as Bergson describes it can surely be considered to be the sort of thing that Noë and O'Regan describe as practical knowledge of sensorimotor contingencies. But in this case, it is not required that the perceiver actually *know* the sensorimotor contingencies governing the current sensory input. Instead, the current sensory input provokes a future (or ongoing, continous) action. Or rather, the *recognition* of a set of sensorimotor contingencies provokes an action. The current aims or interests of the subject would determine which particular action that is provoked. Whatever knowledge might be attributed to the subject in the mode of action-perception can be understood in terms of a subject embedded within the world rather than the subject that has knowledge of how to interpret incoming sensory data in terms of sensorimotor contingencies. This removes the concern that some have with regards to "overconceptualisation" of perceptual experience in Noë and O'Regan's account.

The crucial aspect of habit memory and active-perception is that it does not generate mental images of the world but rather, is a form of direct perception of the world. As opposed to virtual-perception, active-perception leads to action rather than image (re-)production: "Habit rather than memory, it acts our past experience but does not call up its image."[188] What we see in the mode of perception is the world and objects in terms of the actions that are possible within the world. We see objects in terms of what actions would be required to come into contact with them and in what ways we can manipulate them.[189] In other words, we see things in terms of sensorimotor contingencies as Noë and O'Regan argue, but we do so not to generate images but, rather, actions. As Noë and O'Regan also stress the fact that perception is direct and that the world acts as an "outside memory", then it is clear that this form of perception is, at least part of, what they are trying to account for in their account of (visual) perceptual experience. However their account confuses this form of perceptual experience with passive-perception.

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[187] Stephen E. Robbins, "Bergson and the Holographic Theory of Mind," *Phenomenology and the Cognitive Sciences 5: 365-394, 2006* (2006): p. 389.
[188] Bergson, *Matter and Memory* p. 195.
[189] Bergson, *Matter and Memory* p. 264.

4.4 b Passive-Perception

One of the issues that some commentators have with accepting the enactive approach to (visual) experience is that by placing so much emphasis on the role that movement and action; that is, by describing perception in terms of *active* exploration of the environment; is that it thereby fails to describe what is generally referred to as "passive" perceptual experiences. For example, the experience of sitting and quietly contemplating a (possibly static) scene. Noë and O'Regan's response that the movement/s they refer to need only be *possible* but not necessarily actualised, does little to satisfy critics of their account. They may in fact be on the right track. However, in order to make sense of such a claim there needs to be a more thorough explanation of how this process works. Once again, Bergson's account of this type of experience offers just such an explanation.

Bergson's account of passive perceptual experience (which he refers to as "attentive" or "reflective" perception) is grounded in his understanding of recollective memory and time. As discussed above, recollective memory is the form of memory that involves the effort of generating "memory images" of a thing or event. In order to use this ability one must make the effort to withdraw from the lived present and ignore current sensory input to generate and focus on the memory image. Or, as Bergson puts it; "[t]o call up the past in the form of an image, we must be able to withdraw ourselves from the action of the moment."[190] To state the obvious, when we want to recall such an image, we generally close our eyes and attempt to imagine the thing or event we wish to remember. In doing so, we remove ourselves from the experience of time as an ongoing phenomena as we attempt to (mentally) place ourselves in the past.[191]

Similarly, when we want to view and/or contemplate all or part of the visual scene before us, we also "withdraw ourselves from the action of the moment." That is to

[190] Bergson, *Matter and Memory* p. 94.
[191] Alternatively, if we are attempting to imagine some future event, then we are attempting to (mentally) place ourselves in the future

say that we (at least sometimes) stop moving our bodies and use our eyes to "take in" the visual scene. According to Bergson's theory, this allows two things to happen. Firstly, how we experience time slows down. Or rather, what we refer to as the *moment* of perception becomes drawn out, stretched over the course of time that one chooses to examine the visual details of the scene. In this mode of perception, we do not act upon perceptual information but focus on it as an activity in itself. Secondly, by not acting in response to perceptual information (through the capacity of habit memory), this mode of activity allows virtual memory to become involved in the process of perception through the capacity of recollective memory and generate a detailed perceptual experience of the accessible visual field. But that is not to say that virtual memory thereby necessarily creates a perceptual *image* or a *virtual content/image* (in Noë's use of the term). In this situation, virtual-recollective memory allows more sensory/perceptual information to be experienced during the ongoing *moment* of perceptual experience:

> [Virtual] Memory thus creates anew the present perception; or rather doubles this perception by reflecting upon it either its own image or some other memory image of the same kind… And the operation may go on indefinitely; - memory strengthening and enriching perception, which, in its turn becoming wider, draws into itself a growing number of complementary recollections.[192]

This is not to say that such perceptual experiences involve the creation of a detailed and complete mental image. Although the way Bergson puts it above might suggest that it does, that it might seemingly involve a process of "filling-in", he goes on to argue that this not the case and that this form of perception:

> Is a *circuit*, in which all the elements, including the perceived object itself, hold each other in a state of mutual tension as in an electric circuit, so that no disturbance starting from the object can stop on its way and remain in

[192] Bergson, *Matter and Memory* p. 123.

> the depths of the mind: it must always find its way back to the object whence it proceeds.[193]

This means that virtual memory allows more information to be held in the current perceptual experience. In order to acquire sensory stimulation or perceptual information of a part of the visual scene one must revisit that part of the scene. Virtual memory only allows one to know, on account of occurrent (as in contemporaneous) perceptual input, how that input relates to the rest of the visual field and how to go about re-acquainting ourselves with it. In short, over the duration of a passive perceptual experience, we recognise the various elements of the scene and perceptually piece them together over a period of time.

Recognition generally can take two forms. If I wish to use a hammer to drive in a loose nail I have spotted; I can go to the shed, pick up the hammer, return to the nail and rectify the situation while not necessarily focusing on what I am doing. That is, I am in the mode of active-perception as described above. Or I can be sitting idly in the shed, listening to the cricket on the radio, and recognise a particular object as a hammer and focus on the various aspects of it such as its size and colour. But this second mode of recognition, on Bergson's account, does not involve the production of a mental image. In this mode:

> Recognition is actively produced by memory images which go out to meet the present perception; but then it is necessary that these recollection, at the moment that they overlie perception, should be able to set going in the brain the same machinery that perception ordinarily sets to work in order to produce actions.[194]

In other words, passive perceptual experiences are constituted through the same sensorimotor systems that are used in active-perceptual experience. Although we may refer to this mode of perception as "passive" it is still a type of activity, namely, the activity of "seeing". Given that this activity involves the same brain mechanisms as

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[193] Bergson, *Matter and Memory* p. 127.
[194] Bergson, *Matter and Memory* pp. 316-17.

"active" perception, i.e. sensorimotor mechanisms, then it must obviously be correlated with the same sorts of actions that active-perceptual experience generates. On this point, Bergson and Noë are in agreement that all perceptual experience is constituted by the movement/s we are capable of; but in Bergson's explanation of it we find an explanation of the role of memory:

> [T]hough the whole series of our past images [in the form of virtual memory] remains present within us, still the representation which is analogous to the present perception has to be *chosen* from among all possible representations. Movements, accomplished or merely nascent, prepare this choice, or at the very least, mark out the field in which we seek out the image we need.[195]

Virtual memory does not re-project or represent the objects that we passively perceive in the form of mental images but rather represents the visual field in the form of the "nascent" movements, *possible movements*, that would be required to perceive the object *actively*.

This leads to the question of what it is then that we actually see when engaged in the mode of passive perception. Again we find agreement between the accounts of Bergson and Noë/O'Regan that what we actually see is in fact the very objects that exist around us in the world. Noë and O'Regan describe the world as an "external memory store" whereas Bergson refers to it as "pure" or "primordial" memory, but it is clear from what Bergson says that they mean the same thing:

> If matter does not remember the past, it is because it repeats the past unceasingly, subject to necessity, it unfolds a series of moments of which each is the equivalent of the preceding moment and may be deduced from it: thus its past is truly given in its present… The past [is] *acted* by matter, *imagined* by mind.[196]

And so, in spite of the language that Bergson sometimes uses to describe the process, it is clear that his account of passive-perceptual experience is one that is a direct realist

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[195] Bergson, *Matter and Memory* p. 114.
[196] Bergson, *Matter and Memory* pp. 297-98.

account of perceptual experience and that perceptual experience is such that it is constituted by what Noë and O'Regan refer to as practical mastery of sensorimotor contingencies.

To sum up, passive-perceptual experience is a direct, non-representational encounter with the world around us that is constituted by the same sensorimotor relationships that are involved in active-perceptual experience. Bergson's and Noë's account of this sort of experience are essentially identical. The difference between the two is that in Bergson's account we find that the difference between this sort of perceptual experience and that which I have called active-perception is that what we refer to as the moment of perception is extended over a longer period of time. That is, what we refer to as the "moment" is drawn out in passive-perception whereas active-perception – which can indeed unfold over a *longer* extended period of time – consists of what we generally refer to as many *shorter* "moments" which we assume to pass by at high speed. By paying attention to the fact that we do experience things differently in this way, Bergson's account allows for an explanation of the role of memory in the course of experience, which, although recognised by Noë and O'Regan (who accept that certain "storage mechanisms" play a role), is not something which they manage to explain satisfactorily. By considering the moment of perception to be only that amount of time between visual saccades Noë cannot explain why perception seems to be of a larger visual field than is suggested by certain experiments. In the end, what Noë ends up describing when he discusses "virtual content" is simply our ability to *imagine* what scientists tell us we see (between visual saccades). By playing close attention to the phenomenology of our (passive) experience of the world of time, Bergson is able to open up a role for memory and explain the intuition or "feeling" we have that we see more of the visual world than science might suggest, whereas Noë ends up arguing that our visual experience is of such insignificant fragmented details that it does not correlate with the way that we take ourselves to experience a seemingly rich, detailed and broader visual world. Or rather, the way we describe the phenomenology of our experience.

4.5 Real Perception

In the previous sections, I have described two modes of perception, active and passive, based on distinctions found in Bergson's account of perceptual experience over time. This might suggest that there are two distinct types of perceptual experience. But, as I explained, both these modes of perceptual experience are constituted by the same sensorimotor mechanisms. Furthermore, phenomenological reflection – not to mention scientific/psychological studies – indicate that neither mode of perception, as described above, does justice to the phenomenology of our perceptual experience. By this I mean that, when we are moving about (i.e. in active mode), it does not seem as if we do not actually see the things we pass by; nor, when we are still (i.e. in passive mode) does it seem to us that we ever see everything in the visual field all at once – no matter how long we take to observe the world before us.

Therefore the question still remains: Just what *is* actual, *real*, perceptual experience?

The short answer is that actual perceptual experience is both active *and* passive at the same time. In this section, I will discuss how this is so and demonstrate that this account of perceptual experience does provide a phenomenologically apt description of perceptual experience, and, that it is also an explanatorily adequate sensorimotor account of the physiological process of perception. Obviously, this account is a sensorimotor account of perception, and, it is one that is based largely on Noë and O'Regan's version, with the modifications I have suggested throughout this thesis that also utilises the considerations on memory and the phenomenology of time that is central to Bergson's sensorimotor account of perception.

Active and passive perception, as I have described here, describe the two extremes of our perceptual experience. But they are idealised descriptions. On the one hand, our bodies and the things that we are able to see do not move so fast that habit

memory takes over completely to obliterate all visual experience. On the other hand, even when sitting perfectly still, our eyes either move around or saccade in such a way that recollective memory cannot take over completely to (theoretically) provide us with the experience of seeing everything within the visual field all at once.

Real perception is always a mixture of both. While we are moving along at higher speeds we rely more on our habit memory to guide us through and past the obstacles we encounter and as such we do not see as much of the visual details of the things around us that are available to us if we choose to slow down or pause to look at them. At the end of such a journey we cannot, if prompted, re-call, re-collect or even imagine all of the details of the sensory stimulation that we would have received over the course of the journey. For example, after driving from point A to point B, we cannot recall the positions, types, colours etc. of all the cars that have passed by along the way even though the fact that we have successfully arrived at point B is evidence that we have responded to that sensory stimulation appropriately along the way. We have responded out of habit. Alternatively, we also rely on habits, reflexes or skills, to execute manoeuvres that require us to act upon sensory stimulation that we do not have time to perceive the visual details of. For example, we can raise our hands to defend our face from an incoming projectile even though we cannot, if asked, accurately state what that object was. With practise, we can execute more complicated manoeuvres such as catching a cricket ball that flies quickly to slip or gully so fast that we, legitimately, might claim not to have *seen* the ball at all. In such cases, one has trained their body to respond in the appropriate and necessary ways without the need to (mentally, intellectually) recognise what is taking place at the time. Such activities are the pure expression of using our practical sensorimotor know-how to respond to sensory stimulation. During these activities we experience time as moving quickly, or rather the *moments* of perceptual experience are fleeting, and our responses to sensory stimulation are governed entirely by the actions that such sensory stimulation suggest is appropriate, and so, our perceptual engagement with the world is one that is

geared towards future actions rather than towards representing the world as appearing in a certain way.

When we are not moving particularly quickly, if at all, and/or the objects before us are still, we experience longer moments of perceptual experience. We can use these temporally extended moment/s to recognise and mentally "take-note" of more sensory detail, and so, when prompted, we can re-call, recollect and re-imagine more of the details of the visual field than we are able to if we moved through or past a particular visual field at a higher speed. Recognition, that is to say memory, *virtual memory*, is called upon to hold much more visual information within the moment of perceptual experience and it is able to do so, or at least it *seems* to us – phenomenologically speaking – to be able to do so because we consider much more sensory stimulation to be included within the same moment than we do when things move more quickly.

Essentially, what is occurring during these moments is that, rather than being attuned to the possible actions that sensory stimulation affords, we are actually attuned to the *activity* of seeing itself. Seeing becomes the activity that we are attuned to, and so visual sensory input is attuned to future visual input/sensory stimulation rather than actions that involve the rest of the body. The stimulation we receive from any given point within the visual field is attuned to the information that previous, future and simultaneous stimulation can provide. When we focus on visual sensory stimulation, we focus on what we can see. Rather than engaging with the environment with our whole bodies, we focus on just one of the "dual" aspects of perception (in Noë's terminology), that is, we focus on what it is that we can and are seeing, rather than on how we would need to move to interact with what we can see. In other words we focus on what we can see in terms of know-that, we can take-note of what is before us, or we can focus on the perspective we have of what appears before us from our vantage point if we so desire.

Vision is still constituted by our “practical knowledge of sensorimotor contingencies” or “virtual memory”, but we are also using our capacity of recollective memory, our capacity to *know-that*, to guide our eye movements in the *practical* activity of *seeing*. In this situation, virtual memory – our store of sensorimotor contingencies – provides and interrelates virtual content into the perceptual experience and so, when asked, people respond that passive vision seems detailed because; as a result of concentrating on what they can see they have learnt or memorised many features of the visual field over a certain span of time which, when asked, they can recall, recollect and re-imagine. The result of this is that people tend to think that vision is highly detailed and uniform because that is the way that they can and do ordinarily re-imagine it in this way. Even when they are moving too fast too see such detail, people will still respond that vision *seems* to be this way, because that is how we imagine to be when we try to think about it and focus on what we have seen.

When we sit in our chair and try to “philosophise” about what we can see, even when we try really hard to pay extreme care to the precise phenomenology of our visual experience, we always end up including more sensory stimulation within the same moment as a result of the fact that we consider such moments of perception to be longer than the time between visual saccades. When we then try to project such an understanding of the content of vision onto what we see when we are engaging within the environment we tend to assume that it is exactly the same because, when we are on the move, we cannot focus on the sensory stimulation that we receive and respond to it at the same time, and so, after the fact, we attempt to recall what we saw and end up imagining what we saw based upon our phenomenological reflections on passive visual activity.

Noë, on the other hand, goes to the other extreme when he tries to imagine what we see as “virtual content” and fails to convince anyone that we really do see such limited amounts of visual information as he claims that we do. When involved in the activity of looking and seeing we have the capacity to see and remember as much

information as we wish to acquire through the activity of looking and seeing. Change and inattentional blindness experiments attest to this fact. There may be some upper limit to exactly how much information we can hold over a given period of time, but this is a matter for the cognitive neuroscientists to discover. Certainly the amount that we can hold in our perceptual experience is far greater than that which Noë claims we are able to.

Thus far in this chapter I have discussed vision and bodily activity, but the account of perceptual experience that I have outline here can be applied to other perceptual experiences as well. When we *listen* to a sound, we *know* what we are listening to. When we *feel* or touch something, we know what we are feeling or touching. When we *taste* or *smell* something, we *know* what we are tasting or smelling. When we feel pain, we know what hurts. When we experience something in another modality we may take longer to determine exactly what it is we are experiencing, and often we can be deceived, but obviously this is also the case with vision. The point is, that in all of these experiences we use varying degrees of know-how and know-that, of practical/habit memory and recollective memory, in order to disambiguate and perceive the received sensory stimulation depending upon our goals or aims at the time. For example, we can use a noise or sound that we hear to either determine the direction from whence it comes and possibly find the source, or we can focus on the type of sound that it is so that we can determine what type of sound it is and/or what sort of thing is making the noise. At a crowded rock festival, we can use sound to determine that the stage (or at least the speakers) is in a certain direction, or we can listen to the noise to determine such things as which song it is and who is performing it.

The role that sensorimotor knowledge plays in all of this is to reflect the world, often in such a way as to afford movement towards or away from it, or to co-ordinate every other sort of imaginable activity – that is to say *action* – that such sensory stimulation is associated with. Sensorimotor routines are “stored” or encoded within the brain in the form of virtual memory. When triggered, such sensorimotor routines can

express themselves in the form of actions that flow from such stimulation or, if we desire, in those particular types of actions that we commonly call seeing, hearing, tasting, smelling, touching and so on. When we choose to perform these special types of activities the sensorimotor routines express themselves (at least partly) as virtual action and allow us to gather knowledge of whatever it is that is the source of the sensory stimulation. We gather "know-that" or conceptual type/s of knowledge of the environment. When we are attending to some task or activity that has as its goal or aim a future activity, sensorimotor routines express themselves in the form of the unfolding process of activity that experience has taught us are necessary to achieving that particular goal. When attempting to achieve a particular goal it is not important that we know or remember all the qualitative aspects of sensory stimulation and as such do not use our capacity to acquire such knowledge. This is because when attempting to achieve a particular goal sensorimotor routines are expressed as "raw" action itself instead of being expressed as virtual action, which could then be recalled as virtual content – or in other words, *imaginative* recollection.

As I argued above, the sensorimotor approach to perception can make use of the idea of virtual content but not as a description of occurrent perceptual experience but as a description of our ability to mentally imagine things that we have encountered through virtual action. As such virtual action and virtual content are at the one end of the spectrum of perceptual experience as the capacity to use our sensory apparatus to gain perceptual information/knowledge of environmental detail. At the other end of the spectrum is simply action. Action is our capacity to respond to sensory stimulation and environmental detail in the way that perception affords us to cope with, manipulate and navigate the world. All perception content is encoded in virtual memory as sensorimotor routines which are called upon to generate either actions or mental imagery/knowledge. Accepting that perception is so constituted means that the "enactivist" can provide an account of perceptual experience in which perceptual content is constituted by sensorimotor contingencies and overcome the concern that one would be required to have some sort of knowledge of what those sensorimotor contingencies are in order to

perceive. When the perceiver is involved in performing actions of some kind, this practical knowledge is expressed in actions. When the perceiver is involved in perceptual activity, this knowledge is expressed in perceptual actions. These perceptual actions – in the form of sensorimotor routines – are also deployed in our imaginative activities. This is what Bergson means by stating that perceiving and dreaming are two ends of the same spectrum. Imagining something, using episodic memory or dreaming are not as stable as "actual" perceptual activity because our virtual memory is not connected to the world and so the perceptual circuit is not held in the type of tension that occurs in perceptual activity.

This sensorimotor framework for understanding perceptual experience that I have outlined may (or may not) sound all very well and good in theory, but I can imagine and understand that many would have difficulty in accepting that this is actually how the process of perceptual experience occurs. I mean, after all, I have not offered – nor do I think that I could currently find – any empirical evidence that could back up this particular (sensorimotor) theory of perceptual experience. But there is definite proof that a machine, if we might consider our nervous system and body as such, can operate in such a fashion and generate "images" by disambiguating lightwaves that are interpreted depending upon the relative position of the perceiver to the percept. The machine, or type of machines, that I refer to are the machines that are used to generate holographic images. Robbins, in his paper "Bergson and the holographic theory of mind" relates Bergsons' account of perception to the way that these machines generate holographic images. Without wishing to re-iterate Robbins' paper the basic idea is as follows: A hologram machine projects ambiguous electron lightwaves onto a holographic plate as well as a "modulated reconstructive wave" onto the same plate. This modulated reconstructive wave disambiguates the electron lightwaves in such a way as to produce a three dimensional image – a *"virtual image"* as they are known – which can be seen by us as "projected" in front of the holographic plate. As anyone who has seen a hologram will know, moving around the image will allow the different aspects of the holographic image to be seen – in the same way as if the object were

really there – and precisely what image is seen is dependant upon the angle at which the viewer is situated. What this means is that, any three-dimensional point in the holographic field contains enough information to reconstruct the entire image (provided that the electron lightwaves and reconstructive wave-set are of high enough resolution). By analogy, the world for us is the field of lightwaves,[197] or in other words, we are – as perceivers in the world – situated within a hologram. The neurological activity in the brain, *neurological waves*, perform the function of the reconstructive wave front in the hologram. These neurological waves are our virtual memory at work, disambiguating the lightwaves that are all around us, in terms of sensorimotor contingencies. There are researches in the field of mind and perception (such as Pribram, Bohm, among others) that argue that our mind is more or less a moist and soft instantiation of a hologram machine. There is also speculation among researches (such as Penrose, Umezawa, Chalmers among others) who have pointed out similarities and links between quantum mechanics, quantum field theory and quantum chemistry which may prove useful in understanding consciousness and perception, or at least provide a alternative paradigm or language through which consciousness and perception can be better understood. Understanding Bergson and the sensorimotor approach to perceptual experience in this way also demonstrates how we can sensibly make sense of the claim that the world itself exists as it own store of memory or, as Bergson puts it, if we are to think of perception as pictorial or in some way photographic, then this photo "is already taken, already developed in the very heart of things and at all the points of space."[198]

[197] In our case we are attuned to photons rather than electrons.
[198] Bergson, *Matter and Memory* p. 177.

Conclusion:
An "*En-Action*" Sensorimotor Approach to Perceptual Experience

Noë and O'Regan present and argue relentlessly for a non-representational (enactive) sensorimotor understanding of perceptual experience. Their particular exposition of a sensorimotor approach has not met with universal acceptance. Essentially they are caught between a "minimalist" conception of perceptual content due to their adherence to a strict interpretation of the result of cognitive science research and their attempt to explain why or how perceptual experience seems much richer to most people. As Noë concedes, they end up pursuing non-circularity and explanatory power at the expense of phenomenological aptness. Noë also concedes that they may have underestimated the difficulty of providing an account of cognition.[199]

In this thesis I have examined and critiqued the elements of their approach, and, along the way I have argued that certain aspects require and can benefit from certain modifications or more careful explanation, which I believe, provides a more satisfying account of perceptual experience. While these modifications may not fully explain and account for every aspect of our perceptual experience in depth I believe that I have at least shown how the key insights of their approach can be understood in a way that is phenomenologically apt and, in certain ways, also adds to the explanatory power of a sensorimotor understanding of perceptual experience.

The idea that perception is a type of action benefits from a more thorough explanation. At times in their exposition Noë and O'Regan focus heavily on the fact that

[199] Noë, *Action in Perception* p. 248 ft. 13. This second admission is a footnote to the first.

perception grounds our sensorimotor relationship with the environment, that perception is in many ways for the guidance of action. At the same time they also wish to give an account of perceptual experience that is not necessarily for the guidance of action. By distinguishing between different forms of perceptual experience, active and passive, I have argued that a sensorimotor approach to perception is thereby in a better position to explain that perceptual experience can and should be considered to be an action or activity in itself at times.

The understanding that the proper subject of perception is one that is embodied, embedded and extended also benefits from a more thorough explanation. Attention needs to be paid to the fact that when describing our particular modes of perceptual experience that our particular embodiment has certain effects on the way that we perceive. With regards to embeddedness, attention needs to be paid to the way that we come to use the environment as an external source of memory and how that source functions in perceptual experience. Extension, particularly temporal extension, also needs to be explained not just simply as the truism that perceptual experience continues over time but that the experience of time itself is something that is subject to perceptual modifications through experience. As I have shown, Bergson's careful phenomenological considerations provide a beneficial account of the way that the perceiving subject is embodied; embedded and extended that provides a sensorimotor account of these aspects of perceptual experience that is both explanatorily adequate and phenomenologically apt.

Noë and O'Regan are adamant that perception is not a process of generating images in the form of conscious of mental representations, that it does not involve seeing "pictures in the head". They construe their approach to perception as an utter rejection of this sort of conception of perceptual experience and a crusade against any type of representational approach to understanding perception. But there just simply is no theory or theorist, representational or otherwise, that supports such an extreme form of represenationalism. They end up attacking a straw man, a phantom. As such they

never properly engage with the claim that perceptual experience is representational in some way.

In the modifications I have suggested to a sensorimotor approach to perceptual experience there is no need, or use of a mechanism for “filling-in” or generating pictorial mental representations, but rather, a role is provided for our capacities of *imagination* and recollection. The Representation Proposal that I introduced in Chapter 2, understood in terms of Bergson’s virtual-images (i.e. in terms of sensorimotor contingencies), provides a role for memory encoding and storage systems, which Noë and O’Regan accept play some role in perception, as well as the phenomenological “feeling” we sometimes have of richness and detail in perceptual experience. The Access Distinction Proposal I introduced in Chapter 2 provides a way to distinguish between the comparatively translucent and non-rich mode of active-perception and the seemingly rich mode of passive-perception. In the mode of active-perception we do not attend to environmental detail, but instead, sensory stimulation enacts sensorimotor routines that generate actions that enable us to navigate our way around the world and fulfil our goals. In this mode we obviously require practical knowledge of a rich set of sensorimotor contingencies in order to carry out these activities successfully. In the mode of passive perception, we also have practical knowledge of a rich set of sensorimotor contingencies, but in this case these sensorimotor routines do not generate action/s but instead provoke our capacities of recollection and imagination to guide the movements of our sensory apparatuses in the action of perceiving. These two modifications still maintain that perceptual experience is constituted by our practical knowledge of sensorimotor contingencies but with the caveat that this knowledge be used appropriately. This is the modification to the Constitution Thesis that I introduced in Chapter 2. In the mode of active-perception appropriate use amounts to generation of actions that respond to sensory stimulation. In the mode of passive-perception appropriate use consists of guiding appropriate manipulations of sensory apparatuses that result in the desired sensory stimulation. This suggests the hypothesis that

hallucinations are the *in-appropriate* use of practical knowledge of sensorimotor contingencies and our capacity of imagination.

Noë and O'Regan present their approach to perception as one that is supposed to account for all forms of perceptual experience. They also introduce the notion that touch ought to be considered as the paradigm for understanding all perceptual modalities. But throughout their expositions of their approach they do not attempt to describe or explain how their approach is meant to apply to the perceptual modalities other than vision and touch, nor do they explain how and why touch should be considered to be the paradigm. In Chapter 3 I investigated the current empirical theories and evidence that relates to some of these "other" perceptual modalities and came to several conclusions. Firstly, touch is not necessarily the best paradigm through which to understand all of the perceptual modalities except insofar as they are spatial. Also, their enactive account of colour perception is not the best way to understand the qualitative aspects of all perceptual modalities. These claims of the enactive approach must be modified in the way that I have suggested or simply dropped altogether.

Perception understood as "practical mastery of apparatus-related sensorimotor contingencies" simply does not lead to informative explanations of perceptual experience across the various modalities. In many ways the activity of perceiving is precisely the activity of focussing on the way that the world (or our body) *appears* or *seems* to us as experienced through that modality. Most modalities – at least sometimes – are an engagement with the perspectival properties. Vision is perhaps the exception in this case in that our visual engagement with visual features is often "detached" in that as in the mode of passive-perception we are usually concerned with (that is, focussed on or attentive to) the "actual" properties of things in the world in the sense of *know-that* and that it is only when we wish to concentrate on the perspectival properties – such as when we are drawing or painting – that we actually pay attention to these visual properties.

The empirical evidence of the way that the perceptual modalities function by preparing for and responding to sensory stimulation also supports the notion of virtual-memory "surging forward" to meet the "incoming" sensory stimulation. The phenomenon of perceptual trapping also demonstrates that this process occurs in visual experience which may be otherwise too "fast" for us to experience the work of virtual-memory in perception in the way in which we can experience it through taste which responds somewhat slower. The inter-modality of perceptual experience and the discovery of multi-sensory neurons supports the enactive claim that there are not specific nerve-centres or neurons dedicated to specific perceptual experiences. This also supports the notion that experience is supported by neural functions which encode responses to sensory stimulation in terms of practical sensorimotor skills, which fits well with the claim of Bergson that perception is encoded in terms of sensorimotor skills in virtual-memory. Also, the fact that perception is often in some ways attention dependent supports Bergson's proposed role for virtual-memory in that we can attend to a goal or aim or attend to sensory stimulation over time as an activity in itself.

The workings of memory of and in itself has (and continues to be) as hotly contested as that of perception and so it may be contested whether or not memory does in fact exist and function in the way that Bergson proposes, as virtual-memory. But on consideration it actually makes quite good sense. Given that our bodies, including our brain, have evolved over time into the complex entities that we are today and that throughout all that time our primary access to information has been through our sensory apparatus, then it makes no sense to suggest that the brain would ever develop any other forms of encoding information. Even if it did make sense for the brain to develop some other way of encoding memory it is not clear to me how it would develop any other sort of encoding "software" of its own volition. Evolutionarily speaking it would be a waste of energy to develop some other form of encoding information. It could be argued that such a system developed slowly over time but it seems to me to be much easier to use the existing sensorimotor software/hardware to achieve the same result. Arguably the development of a complex language led to the development

of a separate encoding system, but when we are struggling for the word we wish to use we often describe the feeling as having the word “on-the-tip-of-the-tongue”. This suggests to me that even in this case our sensorimotor systems, our virtual-memory, is engaged in this process. Our simian cousins are also demonstrating that the possession of language is perhaps not all that it is made out to be. Indeed the discovery of “mirror-neurons” in macaque monkeys provides possible evidence of the way that virtual-memory may function at the neuronal level. Perhaps, by understanding memory and its role in terms of Bergson’s virtual-memory we may even have a way of understanding Noë’s (unsupported) claim that perception is “virtual all the way in.”

In their expositions of the enactive approach, Noë and O’Regan often misdescribe the phenomenology of experience. If we pay attention to the experience of time as it relates to perceptual experience and are careful to distinguish between various modes of perceptual experience then I believe it is possible to provide a sensorimotor account of perceptual experience that is explanatorily adequate and phenomenologically apt. This “Enaction” approach to perceptual experience, if I may coin a term, maintains that active-perception is non-representational in the way that Noë and O’Regan take it to be as well as provides an explanation for why perception seems rich when we reflect upon it. Passive-perception is still a direct form of perception but one that uses virtual-memory over time to give the impression of richness – thanks to our capacities to recollect and re-imagine – and maintains that the world functions as an external memory store.

Understood in this way we can better understand the phenomena of change and inattention blindness. In these experiments one is focussed on counting how many times certain people catch a ball or some other project, not every detail of the scene, and as such we do not pursue the actions that can be possibly generated by all of our available sensorimotor routines. But at other times, in normal perceptual experience, things “jump-out” at us and demand our attention. Sometimes this happens so fast that we do not properly “see” it but simply react in an appropriate sensorimotor fashion.

Sensorimotor approaches to understanding perception in general also lead to the conclusion that efforts to determine a “neural correlate of consciousness” or to explain the “explanatory-gap” are simply doomed to failure. In terms of a sensorimotor understanding of perception both projects rely on a wrongheaded understanding of consciousness and perception. The “neural correlates” program fails to realise that perception is an ongoing process, a circuit, that does not have a beginning or an end and that no single brain state can be said to constitute a single moment of perceptual experience or consciousness, because perceptual experience/consciousness is simply not constituted of any such discrete moments. The explanatory-gap project fails to realise that there is nothing in the head that explains why conscious perceptual experience is one way or another, or why it is at all, because conscious perceptual experience is not constituted by neural activity alone, it is the mode of connection we have with the world. The explanatory-gap project is often motivated by the suggestion that consciousness is as mysterious as a genie emerging from a lantern. Well, I am sure that even if I rubbed every lantern in existence, no genies would ever pop out, and yet consciousness exists all the same. From a sensorimotor approach there are no deep mysterious aspects to perceptual experience, it is simply the actuality of our mode of existence and engagement with the world that we live in. Complicated though it may be, it is comprehensible. Although I would not be so bold as to claim to have provided all the necessary means by which to understand it here I believe that a sensorimotor approach to perception is far more likely to deliver the goods as opposed to looking for a genie in a bottle.

Bibliography.

Amazeen, Eric L., Guy C. Van Orden, Theophile Ohlmann, Bernard Amblard, Brice Isableu, Arve Vorland Pedersen, Hermundur Sigmundsson, Monique Radeau, Cecile Colin, John T. Sanders, Lawrence Warwick-Evans, Thomas A. Stoffregen, and Benoit G. Bardy. ""on Specification and the Senses": Comments and Reply." *Behavioral and Brain Sciences* 27, no. 6 (2004): 887-900.

Aschersleben, Gisa, and Paul Bertelson. "Temporal Ventriloquism: Crossmodal Interaction on the Time Dimension: 2. Evidence from Sensorimotor Synchronization." *International Journal of Psychophysiology: Current findings in multisensory research* 50, no. 1-2 (2003): 157-63.

Aydede, Murat. ""Introduction: A Critical and Quasi-Historical Essay on Theories of Pain"." In *Pain: New Essays on Its Nature and the Methodology of Its Study*, edited by Murat Aydede, 1-58. Cambridge MA: Bradford Book / MIT Press, 2005.

———. "Pain: New Essays on Its Nature and the Methodology of Its Study." Cambridge MA: Bradford Book/MIT Pr, 2005.

Bergson, Henri. *The Creative Mind*. Translated by Mabelle L. Andison. New York: Greenwood Press, 1968.

———. *Matter and Memory*. Translated by Nancy Margaret Paul and W. Scott Palmer. London: Allen and Unwin, 1911/1962.

Block, Ned. "On a Confusion About a Function of Consciousness." In *The Nature of Consciousness*, edited by Ned Block, O. Flanagan and Guven Guzeldere, 375-416. Cambridge, MA.: MIT Press, 1997.

Bompas, Aline, and J. O'Regan. "Evidence for a Role of Action in Colour Perception." *Perception* 35, no. 1 (2006): 65-78.

Buck, Linda B. "Unravelling the Sense of Smell (Nobel Lecture)." *Les Prix Nobel* (2004): 267-82.

Chalmers, D. "Facing up to the Problem of Consciousness." *Journal of Consciousness Studies* 2/3 (1995): 200-19.

Cohen, Jonathan. "The Grand Grand Illusion Illusion." *Journal of Consciousness Studies 9(5-6): 141-157, 2002* (2002).

Dennett, Daniel C. *Consciousness Explained*. 1st ed. London: Penquin, 1991.

———. "Surprise, Surprise." *Behavioral and Brain Sciences* 24, no. 05 (2001): 982.

Freud, Sigmund. *The Essentials of Psycho-Analysis*. Translated by James Strachey. London: Penguin.

Green, Barry G. "Capsaicin Cross-Desensitization on the Tongue: Psychophysical Evidence That Oral Chemical Irritation Is Mediated by More Than One Sensory Pathway." *Chemical Senses* 16, no. 6 (1991): 675-89.

Guest, Steve, and Charles Spence. "What Role Does Multisensory Integration Play in the Visuotactile Perception of Texture?" *International Journal of Psychophysiology - Current findings in multisensory research* 50, no. 1-2 (2003): 63-80.

Hurley, Susan, and Alva Noe. "Neural Plasticity and Consciousness." *Biology and Philosophy 18(1): 131-168, 2003* (2003).

Jones, Lauren M., Alfredo Fontanini, and Donald B. Katz. "Gustatory Processing: A Dynamic Systems Approach." *Current Opinion in Neurobiology* 16, no. 4 (2006): 420-28.

Kruszelnicki, Karl S. "Sex Organ up Your Nose." Karl S. Kruszelnicki Pty Ltd / Australian Broadcasting Corporation, 1998.

Laurent, Gilles. "Olfactory Network Dynamics and the Coding of Multidimensional Signals." *Neuroscience* 3 (2002): 884-95.

Leopold, D. A. "Visual Perception: Shaping What We See." *Current Biology* 13, no. 1 (2003): R10-2.

Leopold, D. A., F. A. Lenz, N.H. Gracely, T.A. Zirh, L.H. Rowland, and P.M. Dougherty. "Human Thalamic Nucleus Mediating Taste and Multiple Other Sensations Related to Ingestive Behavior." *The Journal of Neurophysiology* 77, no. 6 (1997): 3406-09.

Levine, J. "Materialism and Qualia: The Explanatory Gap." *Pacific Philosophical Quarterly* 64 (1983): 354-61.

Liberman, A.M., P.C. Delattre, and F.S. Cooper. "The Role of Selected Stimulus Variables in the Perception of the Unvoiced-Stop Consonants." *American Journal of Psychology* 65 (1952): 497-516.
Lycan, William G. ""the Slighting of Smell (with a Brief Word on the Slighting of Chemistry)"." In *Of Minds and Molecules: New Philosophical Perspectives on Chemistry*, edited by Nalini Bhushan, 273-89. New York: Oxford University Press, 2000.
Mack, A., and I. Rock. *Inattentional Blindness*. Cambridge, MA: MIT Press, 1998.
McGurk, Harry, and John MacDonald. "Hearing Lips and Seeing Voices." *Nature* Vol. 264 (5588) December 23/30 (1976): 746-48.
Meredith, Michael. *The Vomeronasal Organ* FSU, [cited 19/2/07 2007]. Available from http://neuro.fsu.edu/%7Emmered/extendedText.htm.
Merleau-Ponty, Maurice. *Phenomenology of Perception*. Translated by Colin Smith. London: Routledge, 1962.
Mullarkey, John. *Bergson and Philosophy*. Edinburgh: Edinburgh University Press, 1999.
Naswari, Chritine Wu, and Rose Marie Pangborn. "Temporal Gustatory and Salival Responses to Capsaicin Upon Repeated Stimulation." *Physiology & Behavior* 47 (1990): 1261-66.
Neisser, U., and R. Becklen. "Selective Looking: Attending to Visually Specified Events." *Cognitive Psychology* 7 (1975): 480-94.
Noë, Alva. *Action in Perception*. Cambridge MA: MIT Press, 2004.
———. "Experience without the Head." In *Perceptual Experience*, edited by Tamar Szabó Gendler and John Hawthorne, 411-33. Oxford: Oxford University Press, 2006.
———. "Is the Visual World a Grand Illusion?" *Journal of Consciousness Studies 9(5-6): 1-12, 2002* (2002).
———. "On What We See." *Pacific Philosophical Quarterly 83(1): 57-80* (2002).
Noë, Alva, and J. O'Regan. "Perception, Attention and the Grand Illusion." *Psyche: An Interdisciplinary Journal of Research on Consciousness* 6, no. 15 (2000): No Pagination Specified.
Noë, Alva, and J. Kevin O'Regan. "What It Is Like to See: A Sensorimotor Theory of Perceptual Experience." *Synthese: An International Journal for Epistemology, Methodology and Philosophy of Science 129(1): 79-103, 2001* (2001).
Noë, Alva, and Evan Thompson. "Are There Neural Correlates of Consciousness." *Journal of Consciousness Studies 11(1): 3-28, 2004* (2004).
Noë, Alva, Evan. Thompson, and Luiz Pessoa. "Finding out About Filling-In: A Guide to Perceptual Completion for Visual Science and the Philosophy of Perception." *Behavioral and Brain Sciences* 21 (1988): 738-802.
O'Regan, J. "Solving the "Real" Mysteries of Visual Perception: The World as an Outside Memory." *Canadian Journal of Psychology Vol 46(3) Sep 1992, 461-488* (1992).
O'Regan, J., Heiner Deubel, James J. Clark, and Ronald A. Rensink. "Picture Changes During Blinks: Looking without Seeing and Seeing without Looking." *Visual Cognition* 7, no. 1-3 (2000): 191-211.
O'Regan, J. Kevin, Erik Myin, and Alva Noë. "Sensorimotor Consciousness Explained (Better) in Terms of 'Corporeality' and 'Alerting Capacity'." *Phenomenology and the Cognitive Sciences* 4 (2005): 369-87.
O'Regan, J. Kevin, and Alva Noë. "Acting out Our Sensory Experience." *Behavioral and Brain Sciences* 24, no. 05 (2002): 1011-21.
———. "A Sensorimotor Account of Vision and Visual Consciousness." *Behavioral and Brain Sciences* 24, no. 05 (2001): 939-73.
O'Regan, J., and Alva Noë. "A Sensorimotor Account of Vision and Visual Consciousness." *Behavioral and Brain Sciences Vol 24(5) Oct 2001, 939-1031* (2001).
O'Regan, J., Ronald A. Rensink, and James J. Clark. "Change-Blindness as a Result of "Mudsplashes."" *Nature Vol 398(6722) Mar 1999, 34* (1999).
O'Regan, Kevin, and Alva Noë. "Authors' Response: Acting out Our Sensory Experience." *Behavioral and Brain Sciences* 24, no. 5 (2001b): 1011-30.
Prinz, Jesse. "Putting the Brakes on Enactive Perception." *Psyche: An Interdisciplinary Journal of Research on Consciousness* 12, no. 1 (2006).
Rensink, Ronald A., J. O'Regan, and James J. Clark. "On the Failure to Detect Changes in Scenes across Brief Interruptions." *Visual Cognition* 7, no. 1-3 (2000): 127-45.
Rinberg, Dmitry, Alexei Koulakov, and Alan Gelperin. "Speed-Accuracy Tradeoff in Olfaction." *Neuron* 51, no. 3 (2006): 351-58.

Robbins, Stephen E. "Bergson and the Holographic Theory of Mind." *Phenomenology and the Cognitive Sciences 5: 365-394, 2006* (2006): 365-94.
———. "Virtual Action: O'regan and Noe Meet Bergson." *Behavioral and Brain Sciences* 27, no. 6 (2004): 906-07.
Scholl, Brian J., and Daniel J. Simons. "Change Blindness, Gibson, and the Sensorimotor Theory of Vision." *Behavioral and Brain Sciences* 24, no. 05 (2002): 1004-06.
Shore, David I., and Raymond M. Klein. "The Effects of Scene Inversion on Change Blindness." *The Journal of General Psychology* 127, no. 1 (2000): 27-43.
Siewert, Charles. "Is the Appearance of Shape Protean?" *Psyche: An Interdisciplinary Journal of Research on Consciousness* 12, no. 3 (2006): 1-16.
Simons, Daniel J. *The Visual Cognition Laboratory Home Page at the University of Illinois.* [Webpage]. The Visual Cognition Laboratory Home Page at the University of Illinois., 2003 [cited 2007]. Available from http://viscog.beckman.uiuc.edu/djs_lab/demos.html.
Simons, Daniel J., and Christopher F. Chabris. "Gorillas in Our Midst: Sustained Inattentional Blindness for Dynamic Events." *Perception Vol 28(9) 1999, 1059-1074* (1999).
Suzuki, Satoru, and Marcia Grabowecky. "Evidence for Perceptual "Trapping" and Adaptation in Multistable Binocular Rivalry." *Neuron* 36, no. 1 (2002): 143-57.
Swan, Norman, and Martha McClintock. *Menstrual Synchrony* [Interview Transcript]. 1998 [cited 19/2/2007 2007]. Available from http://www.abc.net.au/rn/healthreport/stories/1998/11122.htm.
Tatler, Benjamin W. "Re-Presenting the Case for Representation." *Behavioral and Brain Sciences* 24, no. 05 (2002): 1006-07.
Thompson, Evan. "Sensorimotor Subjectivity and the Enactive Approach to Experience." *Phenomenology and the Cognitive Sciences.* 4, no. 4 (2005): 407-27.
Vallor, Shannon. " An Enactive-Phenomenological Approach to Veridical Perception." *Journal of Consciousness Studies* 13, no. 4 (2006.): 39-60.
Varela, Francisco J., Evan. Thompson, and E. Rosch. *The Embodied Mind*. Cambridge, MA.: The MIT Press, 1991.