Three Mistakes
About the Senses

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Declaration

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Abstract

Three widespread assumptions about the human senses are challenged. These are that we have five senses, that they function independently, and, for the purposes of theorising perception, that vision can serve as a typical sense. These assumptions underlie most philosophical treatments of the senses in epistemology and the philosophy of perception, but they are mistaken.

Contemporary attempts to count senses generally use some combination of four criteria based on sensations, organs, stimulus and behaviour. I examine these criteria and show them to be separately insufficient and jointly incoherent. In particular, the pluralism of physical theory and difficulties with dividing primary from secondary qualities complicate counting according to stimulus, while the other criteria advise large but indefinite counts.

I consider recent proposals defending the traditional count of five based on language use, proprioceptive awareness, and pragmatic utility, and reject them all. The traditional count is best explained on the basis of differences in sensory experience, coupled with easily identified organs, together with a mistaken tendency to separate the perceiver from the world.

Rather than attempting a more critically informed count, I argue that attempts to count the senses are currently based on false presuppositions regarding the individuation of the senses. I show that the traditional sense modalities are complex and do not function separately. This is achieved by considering the sense of balance, whereby the perceiver participates in dynamical relations. Balance is implicit in all perceiving.

Assumptions that cause difficulties in counting the senses are traced to a preoccupation with vision, which is usually treated as a single sense only instrumentally controlled by the perceiver. I point out that understanding seeing has historically been a misguided effort to explain what is seen on the basis of two-dimensional retinal images and a separation of perception from action.

By noting the dependence of seeing on looking, I argue that seeing has been misrepresented in philosophical accounts of perception. What follows is that some of the important problems of epistemology have arisen from attempts to base theories of perception on a false picture of seeing. The philosophical views of Thomas Reid are used throughout to evaluate the modern debates and place them in a wider historical context.
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During the final year I had the privilege to attend a conference celebrating 300 years since the birth of Thomas Reid. It is hard to overstate how important this was for an amateur in Reid studies, who nevertheless wanted to put Reid’s congenial views at the centre of the argument. I wish to thank the organisers and attendees, whose friendliness and helpful explanations of Reid’s ideas gave me a tremendous boost in confidence.

The early history of the psychology and philosophy of the ‘hidden’ senses is an endlessly fascinating topic and I am grateful to Nick Wade for sharing his detailed knowledge of its intricacies with me. I would also like to thank John Henry, for sparking an interest in Robert Boyle in me all those years ago. Many thanks to Fiona Macpherson for making pre-publication material from her valuable new book on the senses available, and for asking important questions. Thanks too to everyone who has made their reprints, preprints and unpublished work freely available and generously responded to my emailed inquiries.
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This thesis is dedicated to the memory of my father.
And thus as we descend the scale of being,
Nature speaks to other senses—
to known, misunderstood, and unknown senses:
so speaks she with herself
and to us in a thousand modes.

— J. W. von Goethe
Farbenlehre
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Chapter 1

The Tools of Understanding

Imagine something as commonplace as drinking a cup of tea. There is nothing to imagine apart from sense experience. The heat, the taste and the delicate scent are all unthinkable without the senses.

Every sense is involved in having a cup: listening while waiting for the kettle to boil; handling the pot and doing the pouring; noting the colour of the infusion. And then if we recall some words spoken while enjoying the moment, or make some plans, or daydream a little, everything still involves sense experience in the present, the past, or the merely possible.

Present awareness of physical objects arises in perception. This is not to suggest that all the uses of the word ‘perception’ are summed up in this way. It might be said, for example, that in some circumstances something can be perceived without the perceiver becoming aware of that something or noticing it specifically. It might also be said that we can become aware of things which are not physical, perhaps emotions or abstract ideas.

But whatever is decided about the use of words, it is difficult to deny that the sensory realm informs our awareness to the point of dominating it. Even what is usually not counted as immediate sensory experience—remembering, imagining, thinking—moves within what has been or can be sensed or perceived by means of the senses. And although it is traditional to separate the individual’s emotions and feelings from any sensations and perceptions of external objects, the line between the two may not always be easy to draw.

Having healthy, well-functioning senses is important and the loss of even one sense can be traumatic and highly disruptive to our lives. Like every other animal, humans rely on their senses to nourish themselves, avoid danger and pursue their goals. Added to this utility is the importance of sensory
experience in furnishing the inner life. Whatever joys the sentience of other animals provides, it is clear that the achievements of human culture in general are inaccessible without senses.

Given their crucial role then, it is somewhat unsettling to find a long philosophical tradition denigrating them. Here is a classic statement to this effect:

There are two forms of knowledge, one genuine and the other dark. To the dark belong all these: sight, hearing, smell, taste, touch.¹

It is not easy to tell what Democritus means here by contrasting genuine to dark, and it takes some good will to agree that sight is only capable of dark knowledge. Perhaps what is meant is that something in sensory knowledge is unclear or obscure, but the problems apparently go deeper than that:

By convention sweet and by convention bitter, by convention hot, by convention cold, by convention colour: in reality atoms and the empty.²

This famous fragment is explicit in denying reality to sensory qualities. So the problem is a stipulation associated with the word ‘real’:

We in reality know nothing firmly but only as it changes in accordance with the condition of the body and of the things which enter it and of the things which resist it.³

This last may be an innocuous observation, that all knowledge is relational and not ‘firm’. It could also be a suggestion that ‘in reality we know nothing’ since we only know relations, and of these only those that involve our senses. We do not know, in other words, what simply is, but only what our senses connect us to.

There could be many different reasons why a specific sense or the senses collectively may be considered infirm or even unreliable or deceptive. Prominent examples, one already mentioned, come from comparing knowledge based on sensory experience to supposedly different kinds of knowledge, perhaps knowledge of mathematical truths or experiences of higher, religious or extra-sensory

¹Fragment of Democritus quoted by Sextus Empiricus in Against the Mathematicians; Barnes (1987, p. 225). Incidentally, the mention of the five senses here should remind us that Aristotle could not possibly have been the first to come up with this list.
varieties of insight. Another possibility is that ordinary sense experience simply does not carry the conviction or the compelling vitality of certain other feelings or intuitions. Whether such ‘more real’ experiences can be dismissed as species of psychologism is beside the point, as long as they provide a contrast to ordinary sense experience. Doubt can be motivated even in the absence of such contrasts; it can arise simply from apparent conflict or incoherence within sense experience itself.

Whatever reason is chosen for devaluing the senses it is clear that any evaluation can only be justified on the basis of an understanding of what the senses are, how they function, and what can fairly be expected in using them.

It is here that something surprising emerges. The basis for a modern evaluation of sense experience is incomplete to the extent that there is not even agreement—among those concerned with such matters—on how many senses the normal human being has. Although it may seem obvious at first blush that we have five senses and using them comes naturally, a critical modern understanding of sense perception is actually radically incomplete. Further, prejudices distort how the basic problem is posed and distract us from pursuing not only promising avenues toward new conceptions of the senses, but what can be done with them.

It is, as Fiona Macpherson puts it in introducing a new collection of philosophical papers on the senses, “an exciting time to be interested in the senses”.4 Not only is the flood of scientific information on human and animal senses rising ever more rapidly, a lively philosophical debate dealing specifically with basic questions about the senses is also gathering pace.5 Brian Keeley, one of the contributors to this debate, suggests that the classification of the senses is an “underexplored topic” and writes in part “to encourage others to take up the challenge it represents”.6 Just how the basic counting questions—how many senses are there? how are they distinguished?—should be answered in a philosophical context is part of the problem and much will depend on views about what a sense is, how the senses function and how informed opinion on the senses is arrived at. Keeley’s suggestion is that philosophers would do well to adopt the same approach to taxonomic issues which is already used by scientists, specifically those working in neuroethology.

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4Macpherson (2010a).
5The collection of papers edited by Macpherson is a good introduction to this debate. See Macpherson (2010b).
Bringing commonly held notions into question is of course not incompatible with naturalising efforts, but the extent to which some scientific ideas can be used in arguments from authority and the extent to which others are undermined (along with philosophical opinion) will depend on which are chosen. The choice made in the present work follows a search for the most widely held yet rarely defended common or naive opinions which are not only rendered dubious on close examination, but are also associated with philosophical assumptions that have some traction in the formulation of theory.

The ways that sense perception is theorised has far-reaching implications not just for the philosophy of mind and for epistemology but for other areas of philosophical inquiry. The aim here is to examine the senses in a way which points to at least some of these connections and the problems which can arise when even some of the most ‘natural’ distinctions need to be drawn.

1.1 Three Mistakes

The mistakes which are dealt with are all important at the basic level of deciding what a sense is, what a typical or good example of a sense is, and how the senses are used in the acquisition of knowledge. Stated succinctly the mistakes are:

1. That we have five senses.

2. That the senses operate independently.

3. That seeing is typical of perceiving.

The reasoning behind choosing these three is as follows. Firstly, these notions are popularly received and widely accepted. Secondly, they are not only naive views and, although they may have limited relevance to the work done in those sciences where the senses are investigated, various philosophical authorities have until recently rarely questioned them. This does not mean that debate about how the senses function has ever been entirely absent from philosophical discourse, only that a doctrine of five independently functioning senses has often been assumed uncritically in this discourse and there is a widespread practice of assuming that what is true of seeing is true of perception in general. Thirdly, it is important that these notions are not simply falsehoods which can be dismissed by pointing to a few relevant facts. They are half-truths
and as such difficult to dislodge. Whatever is said against them, something can nevertheless be adduced in their favour. The remedy is the adoption of a wider context and an estimation of the contextual limits which apply when these things are asserted as true.

To see why they may be accepted as true can be clarified by offering some simple ways to justify them. For a start it can be said that we do have five senses if what is meant by a ‘sense’ is one of sight, hearing, taste, smell and touch. Whatever additional uses of the word ‘sense’ there are have no relevance to there being five human senses. Although this somewhat dogmatic position easily degenerates into disputes over the uses of words, it does have more to recommend it. Assume, for argument’s sake, that we have eight senses but do not use three of them, or simply fail to notice what these three neglected senses do for us. Can we not then legitimately insist that we have five senses? Should not the investigators who examine the other three endowments be using some technical term different from ‘sense’ in order to avoid confusion? This is no longer a fruitless dispute over words. It tells us something about how we actually operate in the world and what we single out to attend to. We share an understanding of what it means to see something or to touch something and part of that understanding is that there are only five ways to deal with objects in the sensory world.

Asserting that the senses operate independently, or at least can be used that way, also seems to be an unproblematic claim to make. Surely one can touch the teapot independently of seeing it, or hear the bell without feeling it vibrate. Taste and smell are admittedly not as independent, but a head cold soon reveals that the contribution which each of these senses makes to what we ordinarily call taste or flavour can also be recognised.

Lastly, if vision is most important then it is understandable that it should receive attention first. Until vision is understood adequately, it might be claimed, it is difficult to see why effort should be wasted on less important matters, even if it is clear that ‘important’ is not at all the same as ‘typical’ and that generalising claims about seeing to all perceiving may be problematic. Still, it is tempting in concentrating on one sense while paying scant attention to others to make the usual assumptions in proceeding from the familiar to the unknown: analogies and metaphors are taken from what we know of vision, and importance for us starts to blur differences which could have been clear to an unprejudiced inquiry.
Now, as might be expected, scientific work has during the last century and a half generated a rich supply of detailed knowledge about sensory processes and cognition. As might also be expected, some of these findings have been considered and used to bring various philosophical opinions into question. The extent to which individual philosophers draw on scientific findings to inform their views varies with how concerned they are with naturalism and what they construe efforts at naturalising a philosophical position to mean. But drawing on scientifically informed opinion does not automatically lead to progress if some of the relevant assumptions are shared. A critical approach to the science is then part of any thorough critique, which can hardly be reduced to simply correcting philosophical errors by scientific ‘facts’.

Science is a work in progress. New or revised theories routinely replace older ones, new ideas and facts are used to reinterpret what became known previously from measurement and observation. To some extent, each specialist discipline develops its own methods and theoretical frameworks so achieving a clear survey of the present status of scientific work on the senses is an enormous task. An alternative to offering an exhaustive treatment must therefore be sought. The alternative taken up in the present study is to engage mainly with the work of just one philosopher.

To make this strategy viable, the philosopher chosen must be interested specifically in the senses and in naturalising efforts. To avoid getting bogged down in debates which may or may not have any lasting value or significance—in science or philosophy—it is fitting to choose a historical figure of considerable stature. Doing this should make it easier to emphasise the essentially historical nature of scientific theorising. Furthermore, if the three errors can be found to underpin not just recent but also older views, then that would testify to the importance of bringing them to trial. As it happens there is a philosopher who answers our requirements quite perfectly: Thomas Reid.

1.2 Thomas Reid

Reid is the founder of the Scottish common sense school of philosophy. The rapid recent growth in the secondary literature on Reid testifies to his continuing importance, and his place as a leading figure of the Scottish enlightenment can hardly be disputed.\footnote{Valuable introductory articles can be found in Cuneo and van Woudenberg (2004). See also Lehrer (1991). New critical editions of Reid’s major works have just been released, the}
Reid’s most important work—for us—is his *Inquiry into the Human Mind on the Principles of Common Sense* of 1764. The main burden of this is to refute the sceptics and dismiss those philosophers who promulgate absurd beliefs (Berkeley and Hume in particular, but Descartes shares the blame, along with others). The aim is to restore common sense to philosophy, and to bring it into line with the best that scientific thought has to offer. The scientific thought in question is an explicitly Baconian science as pursued especially by “the great Newton”.

What makes Reid a congenial figure for us is that he realises his aims by explicitly discussing the operation and use of the five senses, and that his attempt to overcome the sceptical and idealist tendencies in the “ideal system” is informed by a robust common sense. What follows is thus in some important ways a listening to and a response to Reid. It is not a historical study of his views and influence, nor is it a defence of his system. But much of what he said still makes good sense, and the clarity of his position on key matters is invaluable in assessing how the evolution of scientific theory forces us to reconsider contemporary philosophical opinions.

### 1.2.1 Reid’s Realism

In the 1763 Dedication to his *Inquiry*, Reid wrote that:

> I never thought of calling in question the principles commonly received with regard to the human understanding, until the *Treatise of human nature* was published, in the year 1739.

The *Inquiry*, the result of his re-examination of those principles, was Reid’s repudiation of Hume’s sceptical claims and the errors underlying them. Reid explains that by a careful consideration and observation of sense perception he wished to dismiss the conclusion that we have “no ground to believe any one thing rather than its contrary”.

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8 Reid (2000).
9 Reid (2000, p. 163).
10 “Des Carte’s system of the human understanding, which I shall beg leave to call the *ideal system*, and which, with some improvements made by later writers, is now generally received”; Reid (2000, p. 23), emphasis original.
11 Reid (2000, p. 3).
12 Reid (2000, p. 4).
Finding this conclusion repugnant to common sense but admitting that Hume’s “reasoning appeared to me to be just”, Reid took the argument to be a *reductio ad absurdum* and searched for the problem among Hume’s premises. He located it in a hypothesis which “is ancient indeed, and hath been very generally received by philosophers, but of which I could find no solid proof”. This hypothesis is basic to what he calls the “Theory of Ideas” and this theory, which is by no means original with Hume, can be most simply summed up as the view:

That nothing is perceived but what is in the mind which perceives it: That we do not really perceive things that are external, but only certain images and pictures of them imprinted upon the mind, which are called *impressions* and *ideas*.

This is a statement of the crucial hypothesis as expressed by Reid. The images and pictures present in the mind are representations which are sometimes naively supposed to be in some sense actual copies of external realities, as paintings might be copies of real scenes. However, they cannot be tangible copies and thus they are the forms of things without the matter, in the formulation that Aristotle used when comparing a perception to an impression of a seal on sealing wax. Although this understanding of representations is traced to Aristotle in the *Inquiry*, its development into the theory which Reid is disputing is more recent and he credits Descartes and Locke with it, and Berkeley and Hume are credited with showing that it is absurd—although neither of those two would have claimed that, of course.

Disputing the Theory of Ideas and the hypothesis that it is based on is a large task and in rejecting it Reid sets himself in opposition to a formidable group, including Descartes, Locke, Malebranche, Berkeley, and finally Hume. Although he gives the unnamed author of the *Treatise of Human Nature* prominence, his concern is not specifically with Humean inductive scepticism and he generally attacks all who doubt the existence of the external world or our

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13Reid (2000, p. 4).
14Reid (2000, p. 4).
15Reid normally uses ‘theory’ and ‘hypothesis’ in pejorative senses. He also uses the more neutral ‘ideal system’ and this is adopted by, for example, Daniels (1989). Others use ‘Way of Ideas’, e.g. Wolterstorff (2001), but this phrase does not appear in the *Inquiry.*
16Reid (2000, p. 4).
18Reid (2000, p. 73).
19See particularly Reid (2000, ch. 1, sect. III to V).
ability to know it. He uses a range of strategies against such views, including polemic and ridicule, but the fundamental move against the Theory of Ideas is expressed in an elegant and deep analogy between perception and the comprehension of signs. The picture of human perception expressed in this analogy is old. Reid, however, does not advance it on authority, but as the view that follows naturally from a close observation of the operations of the mind. His approach is self-consciously scientific and his epistemology is thus thoroughly naturalised.

He sets out his approach to epistemology by stating that:

Wise men now agree, or ought to agree in this, that there is but one way to the knowledge of nature’s works; the way of observation and experiment.\(^{21}\)

In his case the observations and experiments involve introspection and he remarks that “the leisure of an academical life, disengaged from the pursuits of interest and ambition […] have enabled me, as I flatter myself, to give a more minute attention to the subject of this inquiry, than has been given before”.\(^{22}\)

Reid’s way of grounding epistemology in basic principles and a method taken from natural science, coupled with a general concern that the account of sense perception is consistent with scientific knowledge of the world, is what I am calling his naturalism.\(^{23}\) He is confident in the new physics and is generous with praise of Newton\(^{24}\) and science generally. When the scientific accounts of phenomena such as heat are a matter of open debate, he seeks general consistency with all plausible theories. Naturalism is thus the very basis of Reid’s common sense philosophy. However, adopting this approach exposes his views to the perennial problem of naturalism: the changeable and fragmentary nature of scientific understanding.

\(^{20}\)One of the delights of Reid’s philosophising is his wit. As Wolterstorff remarks: “Extraordinarily prominent in Reid’s style is wit. The wit is not an adornment on his thought; it is his thought itself, holding up for ridicule philosophy’s departure from Common Sense”; Wolterstorff (2001, p. 248).

\(^{21}\)Reid (2000, p. 11).

\(^{22}\)Reid (2000, p. 5).

\(^{23}\)It is not quite modern naturalism and Reid fits comfortably into his own time: he is happy, for example, to cite the intentions of God and to see evidence of His design in the order of nature and in the human constitution. The phrase ‘providential naturalism’ has been used by Broadie (2004, p. 35).

\(^{24}\)He even asserts, somewhat implausibly, that “[Newton’s] \textit{regula philosophandi} are maxims of common sense, and are practised every day in common life”; Reid (2000, p. 12). On Newton’s principles see Whewell’s more sober analysis in Whewell (1860, ch. XVIII).
In common with other philosophers inclined to realism, Reid is not immune to an overconfidence in the scientific picture of the world (taken as a literal description of reality) prevailing in his time. This remains harmless only as long as it is possible to separate his philosophical views, and the facts as he sees them, from those contemporary scientific opinions which have since proved limited or mistaken. The most important aspect of this is Reid’s adoption, following Locke, of the distinction between primary and secondary qualities.

The way that Reid handles this distinction is fairly straightforward. Secondary qualities of objects are hidden from us. We apprehend only sensations corresponding to them. In contrast, primary qualities are known directly. This does not mean that there are no sensations related to primary qualities such as hardness, only that these sensations normally go unnoticed.

In connection with sensations Reid notes two crucial points:

1. There is no resemblance between the conscious sensation of smell and the processes which may cause the sensation: “it is evident, that neither the organ of smell, nor the medium, nor any motions we can conceive excited in the membrane above mentioned, [the membrana pituitaria] or in the nerve or animal spirits, do in the least resemble the sensation of smelling; nor could that sensation of itself ever have led us to think of nerves, animal spirits, or effluvia”.

2. A sensation such as a smell can be presented to the mind in three different ways: “it may be smelled, it may be remembered, it may be imagined or thought of. In the first case, it is necessarily accompanied with a belief of its present existence; in the second, it is necessarily accompanied with a belief of its past existence; and in the last, it is not accompanied with belief at all, but is what the logicians call a simple apprehension”.

Both points tell against Ideas in the guise of likenesses or representations of the external world. Firstly, if our sensations do not resemble anything in the world, then it must seem that we cannot know what the external world is actually like. The appeal of ‘representations’ understood as copies is diminished when we realise that our sensations are strictly private and we cannot compare them to whatever they are supposed to ‘re-present’ to our mind. Secondly, it is immediately evident that there is a significance in a present sensation of, say,

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26 Reid (2000, p. 27).
the smell of a rose. Since the main concern is with saving the world against Berkeley and Hume, Reid initially stresses that this is a belief which we express by saying that our sensation is caused by a quality belonging to the real, independently existing object.

Now Reid complains that, unfortunately, instead of accepting these facts “the ideal system comes in our way.”27 It tells us that we begin with simple apprehensions and by comparing them, noting similarities and differences, we finally obtain beliefs and judgements. For Reid this account is entirely upside down. He notes that

it is acknowledged by all, that sensation must go before memory and imagination; and hence it necessarily follows, that apprehension accompanied with belief and knowledge, must go before simple apprehension, […] instead of saying, that the belief or knowledge is got by putting together and comparing the simple apprehensions, we ought rather to say, that the simple apprehension is performed by resolving and analysing a natural and original judgement.28

Ordinary experience is thus no mere flow of sensations and feelings. These are meaningful and inform us of real objects. Furthermore, by our constitution we are able to know some properties of objects, namely those qualities which are primary, directly. Since sensations acting as signs play an important role in Reid’s account of perceiving, the question of whether his realism is direct or indirect can be debated, but, as Rebecca Copenhaver has argued, to admit that mediation plays a role in Reid’s epistemological scheme does not undermine his direct realism.29 Crucially, we are not locked into knowing only our own ideas and abstract relations between them.

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27 Reid (2000, p. 29).
28 Reid (2000, p. 29).
29 See Copenhaver (2004) as well as Copenhaver (2000). The debate has recently become quite vigorous and there is no intention to review it here. Suffice to say that the status of sensations is the key to understanding the issues at stake. This is clear, for example, in Benbaji (2007) who argues for a ‘no-sensation’ model of perceiving the primary qualities of touch and vision and even suggests that “it is the ‘qualiaphobes’ who may find comfort in Reid’s no-sensation model”; Benbaji (2007, p. 2). This tries to exploit the problematic status of the objects of vision in Reid’s philosophy and it is moot whether it does any more than draw a caricature of Reid’s views. We will see that much of what follows turns on the same set of issues.
1.2.2 Reid’s Epistemological Scheme

Since the broad outlines of Reid’s epistemological scheme are needed in order to make sense of what he says, it is important to recall the main points here. The problem of how we know primary qualities such as extension, form, solidity and weight was addressed by Reid by proposing that our sensations never resemble the qualities of bodies, they merely suggest them and evoke certain judgements in us. We know the primary qualities as they truly are, but generally do not notice our own sensations when we perceive these primary qualities. This advises an effort at an introspective attentiveness to our subjective states since when we are aware of a primary quality such as the hardness of an object, we enter this awareness by way of sensations which are passed over unnoticed:

The mind has acquired a confirmed and inveterate habit of inattention to them; for they no sooner appear, than quick as lightning the thing signified succeeds, and ingrosses all our regard. They have no name in language; and although we are conscious of them when they pass through the mind, yet their passage is so quick, and so familiar, that it is absolutely unheeded; nor do they leave any footsteps of themselves, either in the memory or imagination. That this is the case with regard to the sensations of touch, hath been shown in the last chapter; and it holds no less with regard to the visible appearances of objects.\(^{30}\)

The order whereby our sensations correspond to certain properties of bodies and processes in nature is pronounced inexplicable by Reid.\(^{31}\) It is vain to ask why a certain movement of the air is sensed as sound while another movement produces sensations of heat; these correspondences are given by God.\(^{32}\) It is not vain to ask, however, how it is that certain sensations assure us of the presence or even the independent existence of real objects. Reid’s basic theory on this, as already mentioned, is the popular one that sensations act as signs for the objects they represent.\(^{33}\) This picture of perception is explicit in Berkeley\(^ {34}\)

\(^{30}\)Reid (2000, p. 82).

\(^{31}\)This should not be taken to mean that Reid thinks the operations of mind are inexplicable, or at least any more inexplicable than certain characteristics of matter and operations of causes. To Reid the mind is as open to naturalistic explanation as the physical world is. See Copenhaver (2006).

\(^{32}\)Reid (2000, p. 57).

\(^{33}\)For the historical rise of this epistemological framework and its relation to problems with seeing, see the invaluable study by Stuart Clark, especially chapter 10; Clark (2007b).

\(^{34}\)See McGowan (1982) and Bradatan (2006).
but, like representationalism in various forms, it is widespread and older than Descartes, Locke or their followers. Indeed it can be traced back to the trope of a Book of Nature which predates Augustine.\textsuperscript{35} The fundamental insight is that what we are faced with in natural phenomena is understood imperfectly and incompletely. We must apply our intelligence to learn to interpret, or ‘read’, the phenomena and to understand their significance in some fashion analogous to interpreting the significance of symbols or reading a book.

The way that sensations serve as signs for qualities and properties of objects does not apply uniformly to every sense in Reid’s system.\textsuperscript{36} The five traditional human senses, which Reid calls the ‘simplest human faculties’,\textsuperscript{37} are treated in the \textit{Inquiry} in his particular order of smelling, tasting, hearing, touching and seeing. It is no accident that Reid has put those senses which acquaint us with secondary qualities first, and only then dealt with primary qualities. It is relatively easy to acknowledge that sensations of smell and taste are mere signs, existing in the mind but not in the world, though all the while corresponding to some actual properties of real objects, or at least caused in an orderly fashion by processes involving specific substances. The same move is far less intuitive in relation to the world of separate, physical objects taking up space in our field of vision. Surely, one may object, there is a clear resemblance in the shapes of things and their arrangement in the world and their shapes and placement in an image or picture.

This difficulty peculiar to vision calls for modifications to the basic scheme and we can distinguish three possibilities. For some senses we become directly aware only of sensations which serve as signs. This is the case with smell, taste and hearing. With touch we not only enjoy certain sensations but apprehend a host of different primary qualities, and normally fail to notice the sensations which indicate them to us. Finally, vision is the most troublesome case. We certainly enjoy sensations specific to seeing—these are the colour experiences which indicate the colours belonging to objects. We also apprehend the primary qualities of extension and shape whereby we locate and recognise objects. But we also learn to perceive depth and make judgements concerning

\textsuperscript{35}The pervasiveness of this trope can be appreciated from the variety of historical figures covered in Vanderjagt and van Berkel (2005) and van Berkel and Vanderjagt (2006).

\textsuperscript{36}The functions of sensations in Reid’s system and how the distinction between primary and secondary qualities relates to distinctions between original and acquired perceptions and absolute and relative conceptions is treated in detail by Buras (2009).

\textsuperscript{37}Cf. Reid (2000, p. 25).
the distance between us and remote objects. The question then arises: what is the original object of vision?

Much more could be said to flesh out Reid’s epistemology, but this would only pre-empt what follows. All that is necessary right now is to note the distinction between sensation and perception which will be needed throughout.

1.2.3 Sensation and Perception

A satisfying account of how we experience the natural world cannot be restricted to formalising and theorising the processes which evoke sensations. As already mentioned, what we do with these ‘ideas of sense’ and how we do it is of crucial importance, and the human understanding is nothing if not a comprehending of the significance of natural phenomena and judging how they may be reacted to and dealt with. The understanding subject is thus better thought of as an agent active in attending to and interpreting current experience, than as a passive recipient of feelings and sensations.

This differentiation of sensory experience into active and passive poles is incipient in the Book of Nature trope which compares our sensory experience to the act of reading. The medieval story goes that mankind was supplied with two books: the Bible and the Book of Nature. All human knowledge is derived from these two sources.\(^{38}\) Human understanding is not immediate and complete (except in extraordinary instances of mystical rapture, granted by grace) and just as reading well is a matter of learning to interpret the words correctly, understanding God’s works is a matter of getting to know the significance of the natural signs given to us in conscious experience. The story may sound quaint and outdated, but scientifically minded people still occasionally mention Galileo’s conceit of mathematics being the one true language of reality\(^{39}\) and, as noted above, aspects of the picture inform empiricist ideas. It keeps cropping up in diverse contexts, in Whitehead and in Helmholtz, to give just two examples.\(^{40}\)

The belief that diligent study of God’s works—in contrast to reading His word as recorded in scriptural tradition—is a good and edifying activity goes well beyond the apparitions in Plato’s cave. Paying attention to sense experience and organising it by bringing systems into it can easily be seen as the

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\(^{38}\) See Vanderjagt and van Berkel (2005) for the development and variety of thought around this topic.

\(^{39}\) Crease (2006). See also Palmerino (2006) for some of the historical detail.

\(^{40}\) Whitehead (1959) and von Helmholtz (1971).


1.2. THOMAS REID

*sine qua non* of the arts, of technology, and ultimately of science. The Book trope has thus been useful at least in that it legitimises sense experience and elevates it from the merely sensuous.\(^{41}\)

Reid incorporated an analogy between sense experience and the comprehension of signs explicitly into his scheme:

> The sensations of smell, taste, sound, and colour, are of infinitely more importance as signs or indications, than they are upon their own account; like the words of a language, wherein we do not attend to the sound, but to the sense.\(^ {42}\)

On this basis he draws a strong distinction between sensation and perception. Whereas sensations are private to the individual subject, what these sensations indicate are real properties of objects and what they ‘suggest’ to our minds are the objects themselves. We thus perceive the real world and perception is not a mere acquaintance with our ideas (or representations) but with the objects themselves.

The distinction is not simply between passive sensing and active perceiving since in perceiving an object we may not be making inferences or judging deliberately. To see this working we need to pursue Reid’s distinctions just one step further and consider the difference between what he calls natural and artificial language. The first is one which we share with the brutes. This

\(^{41}\)The trope is currently an unpopular one with scientists and philosophers in a serious mood. There seem to be good reasons for this. It is, for example, difficult to find discussions that use or mention it which do not also have the Author of the Book striding about (or at least sitting) centre stage. Its origins in religious thought are almost always highlighted. It also appears old-fashioned in comparison with the abstract, technically elaborate theories that have largely displaced it. Still, in so far as these theories invoke symbols or information processing, they borrow at least something from the old traditions. This is true of representationalists who subscribe to computational models of the mind—such as Fodor (1983)—and even materialists like Armstrong who discuss information as if this was a concept transparent and univocal for everyone, for example in Armstrong (1961). The usual modern assumption is that information is something which can be conveyed through space and preserved. Dissenting voices include J. J. Gibson, who explicitly rejects Shannon’s information theory in the context of perception, and Peirce, who dismisses the ‘telegraph operator model’ of perception. Gibson says that “I reject the notion of conduits, the assumption of incoming messages, and I go so far as to question whether there are nerves that should properly be called ‘sensory’”; Reed and Jones (1982, p. 398). See also Gibson (1986, pp. 242–243) and Peirce (1958a, 8.144). (The *Collected Papers* of Peirce are cited by volume and paragraph number, as is standard in the secondary literature.) Peirce’s theory of signs is an attempt at a unified semeiotic.

\(^{42}\)Reid (2000, p. 43).
system of signs (cries, gestures, etc.) is expressive of the inner life and the understanding of it is something that we "brought into the world with us". Babies and brutes alike know instinctively the difference between anger and kindness, as expressed in tone of voice or the expression on a face. The second, artificial language, is one which only humans possess. This language lacks the expressiveness of the natural language—it speaks to the intellect rather than the emotions and the will; and the more it develops the less expressive it is—but it can be elaborated to serve communication in the various arts and sciences. The distinction between natural and artificial language, apart from its immediate appeal, serves to show that our understanding of signs need not be acquired by constant association or habit, nor need it be a matter of laboured inference from immediate experience. By our natural constitution we are already equipped to comprehend certain signs.

By analogy with this natural, instinctive comprehension of signs one can also make sense of perceiving going beyond the enjoyment of sensations. Reid notes that sensations and perceptions “have commonly been considered as one and the same thing”, which they are not. While a sensation “appears to be something which can have no existence but in a sentient mind”, perception “hath always an object distinct from the act by which it is perceived; an object which may exist whether it be perceived or not”. And, further,

the perception of an object implies both a conception of its form, and a belief of its present existence. [...] this belief is not the effect of argumentation and reasoning; it is the immediate effect of my constitution.

Reid’s insistence that perception is a kind of “natural and original judgement” with its own distinctive conceptual content and his characterisation of sensations as elements of subjective experience which, apart from any intrinsic enjoyment or displeasure connected with them, act mainly as signs of an external reality, is not trivially related to what is meant by intentionality and phenomenal character in recent debates. But this is not a disadvantage which must be faced in bringing Reid into the discussion: it is a valuable

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43Reid (2000, p. 53).
44Reid (2000, p. 167).
45Reid (2000, p. 168).
46Reid (2000, p. 168).
47Reid (2000, p. 168).
48Reid (2000, p. 29).
feature which allows us to sidestep the intricacies of certain disputes without directly taking a position in them. The word ‘sensation’ is itself somewhat out of date,\textsuperscript{49} and using it is an opportunity to make it serve our own ends. As we will see, a great deal hinges on what we take sensations to be, and Reid’s starting point in distinguishing passive sensing from a more active process of judging or conceiving (even if this process is a necessity of our constitution) is more fundamental in approaching the three errors than concerning ourselves at the outset with distinctions drawn purely in relation to the objects of experience.

1.3 Outline

The three mistakes about the senses are portrayed as naive errors which collapse under critical examination. They are treated in turn, but some of the complexities of interdependence are brought out as the argument proceeds.

Central is the claim that our modern concept of ‘sense’ is incoherent and I suggest how it should be repaired—by identifying the distinctions causing trouble and insisting that these distinctions must be purely relational. The methodology relies on an examination of the historical process of conceptual development, and the source of the modern counting problem is located in the radical shift from Aristotelian ideas to modern representationalist theories. I am not suggesting that we should go back to an Aristotelian concept of a sense. Even if that were possible, we have a much more detailed understanding of the body now than the Greeks may have had, and understanding embodiment and the activity of the perceiver are fundamental in developing a modern concept.

The key conclusions can be stated succinctly. Although we commonly count five senses, the tradition of five is naive (i.e. uncritical) and largely ignored in science where the senses are not even counted. The gap between common notions and the complex pluralism of scientific ideas shows that our concept of a sense requires clarification. This lack of clarity stands in the way of agreement in an informed recount.

The chief difficulty in defining what a sense is comes from the fact that the senses we do count do not operate independently and we do not know how to individuate senses. The traditional modalities are not only not separate in how they serve an individual, perceivers also do not use them as individuals but as members of a species and culture.

\textsuperscript{49}Cf. Clark (2007a).
Resolving the modern individuation problem is hampered by a preoccupation with vision. The psychology of vision is such that two assumptions seem natural: that perceiving and acting can be separated, and that perception is collecting information about remote objects by using a ‘channel’ which mediates access to reality via images that require interpretation.

Starting with vision is a poor strategy because not only do these assumptions eventually either fail or prove problematic under critical scrutiny, using them as ‘natural’ assumptions leads directly into arguments about what is given and what is inferred; how representations relate to reality and whether the senses yield true representations in some general sense of ‘true’; how representations have intentionality; and even how intentionality (representational content or perhaps conceptual content) relates to ‘phenomenal feel’. The distinctions underlying these disputes—making them even possible—must be re-examined if we wish to clarify our concept of what a sense is.

Seeing is a complex, cultured accomplishment. What we normally mean by the sense of sight is not a single faculty which works independently of other operations and senses. It may be best not to count it as a single sense at all. The broad outlines of what follows may now be given.

1.3.1 Part One: The Counting Problem

The next chapter deals with the counting problem as it arises at the present time. Counting something presupposes a reasonably clear conception of what is being counted and the challenge to the traditional doctrine of five senses is started by noting that this count is naive and practically universal. The first step to understanding this naive tradition is to realise that it is not, as usually assumed, an Aristotelian classification, and that the Aristotelian concept of a sense is quite different to our modern notions.

Contemporary attempts to count the senses, informed by psychology, physiology, physics and evolutionary biology, use four general criteria based on sensation, organ, stimulus and behaviour. These are examined in turn and found to be separately insufficient and jointly incoherent. Three of the criteria, excepting stimulus, tend to produce large but indefinite counts, whereas the unifying reductionism of the physical sciences suggests three senses or fewer.

Representative arguments which make clear the role of naturalism and clarify the technical terminology have been offered recently by Fiona Macpherson. See, for example, her consideration of colour problems in Macpherson (2003) and Macpherson (2005), and of ambiguous figures in Macpherson (2006), and the references therein.
Counting according to the stimulus is complicated by the pluralism of physical theory, and the difficulty in maintaining the traditional division between primary and secondary qualities, which plays a key role in historical explanations of what a sense is and how the senses function. The absence in Aristotle of the modern distinction between the stimulus and corresponding sensation is pointed out and the current philosophical debate on the counting problem is approached in the light of this. Some examples of the ‘new’ senses discovered in scientific work are given.

The third chapter begins by noting that the senses are not normally enumerated in philosophical treatments of perception, or in works on epistemology. Various proposals defending the traditional count of five based on language use, proprioceptive awareness and pragmatic utility are then examined briefly and rejected. Following this, the traditional count is ascribed to evident divisions in subjective experience, their dependence on the functioning of readily identified organs, and a simple division between the perceiver and the world.

The current debate concerning the criteria for counting senses is then reviewed and the tendency to deprecate subjective experience coupled with an inversion of the epistemic priority between fact and theory criticised. It is suggested that this results in false claims that the theoretical picture of the stimulus is true, while subjective experience is unreportable or unreliable, and, therefore, either irrelevant to the problem or requiring validation.

When we are dealing with perception, investigations of orderly relations should not be confined to simple external comparisons or measurements. Relations in which the perceiver plays an ineliminable role must be considered. A threefold structure for perceiving is suggested on this basis, giving an irreducible triad of the active perceiver, the perceived, and the relational structure between them. The perceiver’s active role is illustrated by considering common sense theories of colour and location.

1.3.2 Part Two: Individuating the Senses

The fourth chapter begins with the point that solving the counting problem presupposes that the senses can be individuated. The difficulties in separating the senses are approached by first considering the sense of balance, in which it is clear that the activity of the perceiver cannot be eliminated. The functioning of this sense is also shown to be implicit in the traditional modalities, and it is explained how it underlies not only spatial awareness, but the apprehension of all dynamical variables.
The perspectival character of sense perception and the intentionality of action are linked to the ability to establish a reference frame and exert directed effort, with both achievements dependent on balance. The sensations on which the tradition of five is based are re-examined and found to be complex.

Chapter five considers the challenge of a re-examination of subjective experience as a strategy of individuation. This strategy is obstructed in the current debate by various attempts to reject subjective experience as a basis for classification. The anxiety connected with granting subjectivity a decisive role is ascribed to two distinctions which suggest that private, subjective experience is inscrutable.

Consideration of the principles which are used to separate the perceiver from what is perceived reveal four general divisions, classified here as Cartesian, physiological, biological and social. The last is taken to be the most relevant to the modern individuation problem. Efforts to sideline subjectivity are taken to be unwittingly motivated by the simultaneous use of conflicting criteria for separating the perceiver from the world. I argue that not only are the traditional senses not separate faculties, these faculties cannot be taken to belong to an individual perceiver.

An important consequence of this is that the traditional division of experience into what is public and private becomes arbitrary. The suggestion is made that the distinction between what is subjective and objective must also be revised, and the medieval meaning, in which subject and object are purely relational terms, is proposed as more useful than the disjunctive, evaluative modern distinction which underlies the belief that individual experience is hidden to objective scrutiny, and possibly always idiosyncratic.

1.3.3 Part Three: Vision

In the next two chapters, the adoption of problematic assumptions concerning sense experience, which complicate the counting problem, is traced to the tendency to treat vision exclusively and to assume that the specific characteristics and problems of vision hold generally. Vision is usually treated as a single sense, the recognition of separate individuals is taken to be the prototypical act of seeing, and seeing is often thought to be controlled only instrumentally by the perceiver who is largely passive in absorbing information about the surrounding world. This information comes in the form of a two-dimensional manifold of ‘appearances’, presented to the viewer, and the perceiver’s activity
is supposed to amount to selectively attending to, or at best learning how to interpret these appearances.

These opinions are all undermined. Firstly, chapter six begins in noting that vision is unique, in that geometrical considerations are important in formulating theories of seeing. Historically, this has been largely an effort to explain how a three-dimensional world is seen on the basis of two-dimensional retinal images. Using some results from modern cognitive psychology and drawing on challenges to the so-called camera model of the eye, the crucial role of the active perceiver and their learning is revealed in the multisensory achievement we call ‘seeing’. The existence of a two-dimensional manifold of data, supposedly presented to the viewer, is denied.

The picture-taking model of seeing is presented as problematic in giving rise to two conflicting ways of thinking about the eye: it is either very good, or very bad, as an optical instrument. I find, in the light of this, that arguments over how much is given and how much inferred in seeing have dominated the discussion, and suggest that the main problem is an overly restrictive notion of inference which separates symbolic thinking from action. Relevant authorities, both scientific and philosophical, are then cited to suggest that seeing need not have anything (spatial) originally given, that it is dynamic, and that the image is not a picture but a complex sensation. What we see is achieved by developing habits and by using multiple modalities, mainly the eye senses and the vestibular and proprioceptive senses in the case of vision.

Chapter seven continues the argument by admitting that geometry and perspective are relevant to the analysis of what we see. However, a commitment to a ‘reading pictures’ paradigm of seeing assumes that a two-dimensional manifold is given, and the locations, shapes and directions of objects are inferred. I point out that this suggests that we are all good at interpreting pictures, but this is easily dismissed by counterexamples.

The importance of motion is then noted, and I draw attention to the idea that what is inferred in our field of view is estimated and anticipated, so it should not be expected to match the geometrical projection which is necessarily static. The activity of looking can be shown to be primarily an effort to gauge the probable movements and locations of remote features. Recognising the importance of motions and their context in these efforts explains the presence of the so-called visual illusions, which indicate how important the prioritising activity of the perceiver is.

The profound reliance on inference and estimation in seeing leads to various
failures of expectation. Some of these failures have been used to motivate the idea that not only is sense experience merely representational, but also that it gives a misleading or deceptive view of what is real. If these views suggest that lawful perceptual relations generate illusions, they beg the question on what is real. If they instead rely on occasionally mistaken judgements of individual perceivers, they are prone to be dismissed as unsupported. Although the senses may be considered fallible, they are not fallacious.

It may be puzzling that Thomas Reid, who has been given such prominence in the introduction, has not even been mentioned in the outline. His role in the work is to act as an occasionally visiting interlocutor whose views are sought at particularly significant junctures. His historical place and intellectual acuity qualify him perfectly for this role. It may seem that what is said about Reid is somewhat dismissive and critical, but this is not a fair reflection of my views. Not only are some of my central claims deeply indebted to his philosophical discoveries, even when I feel compelled to insist that he is mistaken the mistake in question is highly instructive. When the brilliant common sense philosopher makes a claim which offends common sense, we should take careful note—a deep problem lies there hidden.
Part I

Do We Have Five Senses?
Chapter 2
Counting the Senses

Here is a simple experiment: sitting comfortably in a quiet room with eyes closed, use the tip of the index finger on your right hand to touch your nose. Now which of the five senses were used to achieve this? None of them.

There is touch of course, but that only comes into play when contact is made. Some people visualise what they are doing, but this is unnecessary. We perceive the relative positions of our body parts, although not all body parts. We also perceive their motions—all manner of motions though not all the motions that are found in them through measurement, and again not motions of all parts and not all the time. Some motions are largely ignored but easily attended to; the heartbeat is a good example. It is usually subliminal but readily felt and sometimes intrudes in awareness. Apart from position and movement, we perceive a rich variety of other feelings in various parts of the body.

How one relates these perceptions to the list of five senses presents various options. One of these is to say that the traditional five are senses for external objects and any other perceptions may be based on a list of internal or bodily senses. The little experiment involves the body senses, it relies on proprioceptive knowledge, as the scientists put it. This procedure of simply adding extra senses is popular in scientific circles although, as we shall see, adding senses is easier than agreeing which or how many should be added.

A different option is to insist that anything perceptible is perceived by means of the five and the usual meaning of ‘touching’ will already accommodate whatever bodily perceptions come to our notice. To make this at least plausible, do we not admit that feeling that something is cold by touching it is very much like simply feeling that our fingers are cold? The sensation of pres-
sure that comes in making contact with an object is quite separable from the ‘touching’ sensation associated with the cold. Touching has not one but many sensations associated with it, and there is no reason why touching cannot be the source of not just diverse sensations but diverse kinds of information too, just as seeing informs us of colours, shapes, locations.

Such solutions to the nose-touching problem may have some merit, but in applying them too hastily we miss the opportunity to examine an extremely important issue. The interesting question is: why do we actually count five senses? This problem has, since about the middle of the nineteenth century, become more urgent because of a widening gap between scientific ideas about the senses and popular wisdom about the traditional five. If we wish to understand how it is that some clearly identifiable senses seem to have been missed in the traditional count, and why scientists have not managed to agree on a revised list, then we must reconsider how the original list was arrived at and what is wrong with the criteria that we now use to count the senses.

Examining the historical development of thinking about the senses starts with Aristotelian ideas in the West, since the responsibility for the doctrine of the five senses is usually given to Aristotle. The first point to notice is that the tradition of five is naive. It is not scholarly, especially not specifically Aristotelian, although it is routinely said to be. Then we must acknowledge a radical shift in the concept of what a sense is from the older traditions to ours.

The modern counting problem is best approached by looking at the criteria we now use to count senses. Four main criteria—broadly based on classifying sensations, sensory organs, stimuli and behaviours—are used in modern attempts at counting. These criteria are shown to be separately insufficient and jointly incoherent.

Even when these criteria are used in various combinations, a definitive number is unobtainable since the two criteria which seem most important—those based on stimulus and the natural divisions of sensory experience usually classified as separate sensations—pull in opposite directions. This problem does not exist in the older traditions, such as, for example, the Aristotelian system of the senses, and after we explain how it is avoided by Aristotle, the gap which has opened up between the naive understanding of what a sense is and the scientific concept (which is not univocal in science) can be illustrated by considering some of the non-traditional senses.
2.1 Criteria for Counting Senses

It is often suggested that we owe our count of five senses to Aristotle. Susan Stewart goes as far as saying that “the notion of ‘five senses’ is usually attributed to Aristotle”, and it is true that Aristotle generally gets a mention, sometimes even the blame. Although it may be no more than a turn of phrase, Brian Keeley talks of “Aristotle’s five senses” and then suggests that the question of how we should count the human senses is “Aristotle’s problem” and, incidentally, “rather hoary”. William Fish even manages to date this tradition: “The traditional view (which dates back to Aristotle—De Anima [. . .]) is that we have five”. And when Helmholtz mentions “the five senses” while discussing sensations and impressions, his editors kindly clarify that “this Aristotelian classification has now been abandoned”.

Now while it is true that the main sources of the Western scholarly tradition associated with the five senses can be expected to be twofold—Aristotle and the Bible—one in fact hardly needs to consult a scholar to realise that we have eyes and ears, or read a book to learn what we normally do with them. As David Armstrong says:

> Quite early in life we learn that the acquiring of certain very complex and idiosyncratic patterns of information about the current state of the world is bound up with the operation of certain organs or combination of organs.

The ‘head senses’ are easily noticed. Eyes for seeing, ears for hearing, nostrils for sniffing and smelling, mouth and tongue for tasting. Touching is a slight

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1 Stewart (2005, p. 61).
2 Consider “Aristotle was wrong. Often credited as the first to catalog the human body’s primary senses, he neglected to mention one of our most important [. . .]”; McCredie (2007, p. 3).
5 Fish (2010, p. 149). This kind of throwaway remark does not deserve to be pushed too hard, except that it reflects an uncaring attitude which is quite widespread.
6 von Helmholtz (1968a, n. 1, p. 84). One might wonder: abandoned for what?
7 The value placed on authority has shifted dramatically with the rise of modern science. For an account of the crucial period, and the key role of Robert Boyle, see Shapin (1994). Charles Sanders Peirce, a most authoritative contributor to the development of logic and epistemology, sees it this way: “The most striking characteristic of medieval thought is the importance attributed to authority. [. . .] Next to sacred authorities—the Bible, the church and the fathers—that of Aristotle of course ranked the highest”; Peirce (1958a, 1.30).
8 Armstrong (1968, p. 212).
problem. But the sensitivity of the body to contact can hardly be ignored and, taking our cue from babies which have learned to crawl, or from toddlers, it might be suggested that the basic flow of human activity goes like this: hear and notice, see and locate, go and grasp, and then smell and taste. Smelling alone might of course announce something pleasant or unpleasant at any stage of the proceedings, and seeing—or better to say exploratory looking—can often substitute for listening and hearing.

The idea that Aristotle originally counted five senses is, however, misleading in some important ways, and since some of the issues he dealt with still prove important today, a closer look is needed at why we should not blame him for the count of five. Some comment on how deep the cleft between Aristotelian traditions and more modern views can then be appended to the discussion of the main criteria on which the current debate is based on.

The belief that our common count of five senses is Aristotelian is false for several reasons. Firstly, as already noted, five senses are easy enough to identify. It would be expected that traditions other than European ones would come to the same number and this is indeed the case. Nevertheless, saying that five senses are easily noticed is quite different to saying that five is the true number, or the best number that might be arrived at after careful consideration. Indeed we must carefully distinguish naive traditions, in which knowledge of the senses is acquired by use and finessed by imitation and a count of five is passed down as common knowledge, from scholarly views. Calling the count naive also does not quite explain it, and we will have to consider how it might be arrived at in some detail later, but an important aspect of the mistaken attribution of the count to Aristotle is that he must have already known what the ‘right’ answer should be before going into any detail on how this might be justified, how the senses operate and how they can be distinguished from other faculties of the soul. If Aristotle can be blamed for anything—and it would require a thorough exegesis of his works to make the case—it is that he apparently lent his authority to a naive count for a special subset of the soul’s faculties. He seems to have been content with five because this is a “sacred or magical” number. It is an injustice to give

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9 Although the face is sensitive to touch, and medieval manuscripts sometimes made do with a picture of the head when the senses were illustrated, the prototypical instrument for touching is the hand.

10 See for example Jütte (2005).

11 Jütte (2005, p. 20). Just as Newton knew—presumably wearing his alchemist’s hat—that there would be seven spectral colours, five is the right number of the special senses,
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Aristotle either credit or blame for the number, while politely ignoring the kind of ‘numerological’ thinking which invested five with a special significance. Nevertheless, if anything should be called ‘Aristotle’s problem’, it is something else entirely; as we shall see, it is the fact that five is such a difficult number to reconcile with the facts from empirical investigations.

But the main reason why we should resist talk of Aristotle’s five senses is that the Aristotelian tradition does not count five senses. At least in medieval Europe, scholars generally counted nine or ten. Aristotelian psychology can be most easily thought of as a complex faculty psychology. What we call the five senses are indeed separate faculties in this picture, but they do not do the work we might now expect of them. For a start, they do not bless us with the enjoyment of colours, sounds, smells, etc. For this to happen we need extra faculties which discriminate what is received and present it to sentience. Using our modern word ‘sense’ causes some of the trouble, and the older Anglo-Saxon word ‘wit’ is the one to look for when counting faculties of cognition in the tradition. We then indeed find ten wits—five outer and five inner wits. The newer French word ‘sense’ was eventually used for an outer wit so that Shakespeare could write:

But my five wits nor my five senses can
Dissuade one foolish heart from serving thee.\(^\text{12}\)

Later still—except in phrases such as ‘living by one’s wits’ or ‘lost his wits’—wit became merely a talent for being clever or amusing, and ‘sense’ took over almost entirely so that understanding something (formerly the task for an inner wit) became making sense of it.

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\(^{12}\)Shakespeare’s sonnet CLXI. This is quoted in a slightly different version in Lewis (1964, p. 162), where additional remarks on the inward wits and the Aristotelian tradition, as understood in Europe, can also be found. See also the third meaning of ‘wit’ in the Oxford English Dictionary.

four is the right number for the elements, and so on. It is not possible to grasp this style of thinking without at least entertaining the cosmological doctrine of man as a microcosm of the world macrocosm which pervades older traditions in India and China—see Jütte (2005, ch. 2)—as well as in pre-modern Europe. On European views see, for example, Tillyard (1963). That Aristotle’s reasoning is cosmological can be seen from the role the elements play in justifying the number of senses at the beginning of Book III of de Anima. See Barnes (1984, pp. 675–677). Wallace thinks that “the reasoning, however we may try to connect it, is distinctly inconclusive”; Wallace (1976, p. lxiv). Incidentally, it might be suggested that Aristotle’s arguing for the count of five is enough to convert a naive tradition into a scholarly doctrine. Even if this argument could be carried through, it would only work for Europe and the Near East, and that would hardly explain why humans generally count five as they do.
CHAPTER 2. COUNTING THE SENSES

There is no need to go into the details of this rich tradition, except to say that the strategy of insisting that in counting senses we are only talking about the external senses, or the outer wits, begs the question on how perception works, and what a sense is, without even paying attention to what Aristotle or his followers actually wrote.

The complexity of the Aristotelian tradition implies that calling our count ‘Aristotelian’ would make sense only if there was a substantial commonality between modern and Aristotelian ideas on how the senses function. That this does not apply can already partly be seen in the older tradition counting wits, but modern ideas show a substantial shift in priorities from former times, and even what is to us a natural opinion—that the senses are input channels whereby we receive information—does not apply in earlier times. The development of our tradition is complex, but at least some aspects of it are directly relevant here.

As might be expected, what is most important to human beings gets placed high on the list and the counting problem is something left for specialists to grapple with. Social beings with a language and some senses will have two major sources of knowledge, and these are direct experience and testimony. The importance of these is that they can tell of remote objects and events (remote in space and time, but even remote in the sense that they may be imaginary), and so if we are to pick out the most important senses for an animal—a purposefully moving organism—it will be those informative senses which enable movement to a remote goal.\footnote{Or, of course, avoiding an impending threat.} As Reid notes, for example, “there are three of our senses which give us intelligence of things at a distance: smell, hearing, and sight”.\footnote{Reid (2000, p. 99).} Taste is secondary since it requires contact, and only some aspects of touch are of any use in directing movement (these include feelings of warmth, radiant heat, wind direction) since most need contact also.

In a culture which values vision most, seeing can serve as a proxy for all direct experience, so we have just two sources of knowledge: seeing (experience) and hearing (for testimony using vocalised language). This ‘big picture’ epistemology was summed up long ago in one of the wisdom books of the Bible:

Many such things have I seen with mine eies,
and mine ear hath heard greater things then these.\footnote{Ecclesiasticus 16.5 (The King James Bible of 1637). Spelling unchanged except for replacement of the long s.}
As it happens the book from the Apocrypha that this couplet comes from, Ecclesiasticus, is perhaps the unique source of yet another tradition in English culture. This time a count of seven wits: the familiar five plus speech and understanding.\(^\text{16}\)

It would be wrong to pretend that even what might be called specifically English culture in, say, the fourteenth century could be characterised by a simple uniform tradition.\(^\text{17}\) What one understood of sense lore depended, of course, on one’s station in life. Further, as we have already seen it would certainly be wrong to suggest that there was a unique source of the traditions in the West. Finally, there is no reason to expect that the counting problem, with scholars busy balancing and confusing various traditions and insights, would ever remain settled for long.\(^\text{18}\)

Excavating the biblical example offers a fascinating glimpse of some of the competing interests, and although it would lead to a digression to outline it in any detail, one crucial aspect of it must be mentioned. Chapter 17 of Ecclesiasticus deals with the creation of man, in the image of God. Here are the relevant verses taken from the King James version of the Bible:

5 [They received the use of the five operations of the Lord, and in the sixt place he imparted them understanding, and in the seventh, speech, an interpreter of the cogitations thereof.]
6 Counsell, and a tongue, and eies, ears, and an heart gave he them to understand.\(^\text{19}\)

Applying a little sensitivity, the intention behind verse 6 seems quite clear. With our eyes we see the created world, with our tongue and ears we have the godlike (and human) abilities to speak and listen, to issue words and understand them, and with discretion and understanding we can judge good

\(^{16}\)The tradition is noticed by Hacker without detailed comment. See Hacker (1987, n. 9, p. 60). Jerry Fodor stumbles across speech when searching for input channels for “central processing” in his computational picture of the mind. Warning us first that “eyebrows should commence to be raised starting here”, he suggests “psychological mechanisms that can plausibly be thought of as functioning to provide information about the distal environment” to be “the perceptual systems plus language”; Fodor (1983, p. 44), emphasis original.

\(^{17}\)Woolgar (2006, particularly ch. 12).

\(^{18}\)To take just one example, the Aristotelians could never quite decide how many inner wits there really were. A good discussion of the Thomistic tradition is provided by Brennan (1941).

\(^{19}\)The King James Bible of 1637. Spelling unchanged except for replacement of the long s. ‘Operations’ is now usually rendered ‘faculties’. Note that verse 5 is interpolated but the source of the count of seven.
and evil, and comprehend the order of creation. Although this is clear in the context of knowledge derived from experience (seeing), receiving and issuing testimony (speech), and comprehending and evaluating both (understanding and judgement), this list seems incomplete when compared with Aristotle and the head senses (tongue for tastes?, ears for sounds?). Helpful translators facing this difficulty have managed to stretch this list of five into seven, thus giving us glimpses into the shifting opinions on what it is that is important about being human in this world.

It could now be objected that there is needless confusion being generated here by mixing ‘senses’ with ‘faculties’. This kind of objection begs the question on the whole issue of what a sense is. All these faculties play their various roles in cognition. Of course the five senses have their physical organs, but the heart and brain were said to play a parallel role with faculties such as emotion and reason, so the presence of organs does not in itself tell much.

Furthermore, the objection misses a crucial point. What was meant by a sense in these traditions is something quite different to what we usually mean by it, and our restricted meaning has implications which complicate the counting problem. Anyone who understands the senses in the modern manner, as channels whereby information is conveyed to the subject, need not, on account of that understanding, have any notion of what Aristotle or the traditions which followed him might have been talking about. The philosophical tradition of five is not just discontinuous; it is fundamentally broken. While the relevant Greek words cannot but be translated as sight, hearing, smell, taste and touch, almost nothing at all about these senses carries over into common modern ways of thinking about them. One only needs to be reminded that in the medieval interactionist picture of the perceiver balancing between extremes, touch was a polarity of both touching and being touched, speech was speaking and listening, and:

Speech was popularly recognised as part of the sensorium, even if it was excluded in some ecclesiastical contexts. The human body and its senses were not regimented, enclosed and exclusive in their perceptions. Many things might have effects on the body and the body might equally affect them. These effects were often explained in the medieval period as ‘virtues’ or ‘powers’ of substances and they were as much a part of the process of sensation as vision or hearing, operating in a similar twofold way.\footnote{Woolgar (2006, pp. 27–28).}
Before saying any more about what can still be gleaned about counting senses from Aristotle, it is best to look at modern ways of doing it, but it should now be clearer what is at issue here. Counting senses is not disputing expressions of the naive understanding which count eyes and ears, hands and feet. This, however, is not an adequate basis for clarifying what is contested in philosophical disputes. To join in these debates with some hope or resolution, we need to be explicit on what it is we are buying into when someone says ‘I see red’. What is this faculty of seeing and how should it be analysed? Is ‘I see red’ the same as ‘I see a teapot there on the table’? This is unlikely, so is seeing a mixture of abilities? Or is it elemental? These become key questions as soon as an investigation of our sources of knowledge begins.

The usual modern starting point for this analysis is to collect the relevant criteria for calling something a sense. There are chiefly four: sensation, organ, stimulus and behaviour. The basic problems in using them are presented now.

### 2.1.1 Sensations

In highlighting the discontinuity in what is traditionally understood by a ‘sense’, the following essential point seems to have been missed: surely the phenomenal experience of a colour or a sound is the same, even if all the theoretical and cultural accretions are turned upside down or inside out. After all, most humans have the same eyes to see with and ears to hear with.

Eyes for seeing colour, ears for hearing sounds, nose for smelling scents; there is an experiential, subjective but undeniable difference in quality (for want of a better word) between colours and sounds and scents. There are admittedly undeniable differences between purple and yellow and between the notes from violins and flutes but colours and sounds are, well, more different or differently different. We talk about our experience as if these differences were self-evident. Helmholtz once expressed it by claiming that

> the impressions derived from external objects fall into five groups, entirely distinct from each other. These correspond to the five senses, and their difference is so great that it is not possible to compare in quality a sensation of light with one of sound or of smell.

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21 Lehrer against Armstrong in Lehrer (1974, pp. 91–100), may serve here as a typical example. Lehrer discusses the incorrigibility of beliefs about sensations.

22 von Helmholtz (1968c, p. 84).
The differences in question are based on discriminating the variety among sensations and the challenge here is to use experience, in so far as possible direct experience, to enumerate the senses.\textsuperscript{23} One does not need to even be aware that one has eyes and ears to be aware of divisions in the flux of sensations.\textsuperscript{24} Unfortunately, starting with colours and sounds is like wading into the shallow end of a pool; trouble is only noticed when the water gets deeper. Remaining in the shallows, however, makes it too easy to mistake a competence with the familiar for some kind of fundamental principle and offers a mere pious hope that the counting problem will be resolved in this way against evidence to the contrary.

To see the general problem one only has to substitute pain for colour. The claim that we all experience the same red in front of the teapot sounds like common sense. To say the same of pain following a given injury or bodily strain is plainly nonsense. It is not even nearly true for the repetition of a stimulus in one individual.\textsuperscript{25} Variability occurs partly because the pain suffered is conditioned by expectations and priorities. Perhaps these complications arise because colour is something sensed while pain should be counted as something else, but that clearly begs the question on what a sense is again.

Using firsthand experience to build a taxonomy of the senses amounts to a re-examination of sensations. Even this may be saying too much since it assumes an unproblematic distinction between emotions, feelings and sensations, but one has to start somewhere. The natural starting point here is to attend to the qualities of sensation and some of the appeal of the traditional system is largely based on the vivid qualitative unlikeness between colours, sounds, odours, etc.\textsuperscript{26}

\textsuperscript{23}The term ‘sensations’ will generally be used for what in current debates are now also called ‘qualia’. The latter term will be avoided since using it calls in a conceptual framework in which the distinction between ‘phenomenal feel’ and ‘representational content’ is the leading issue. ‘Sensation’ is the term which Reid uses to signify subjective experience in contrast to ‘quality’, which belongs to a body or object, and also as distinct from ‘perception’ which for Reid involves more than pure sensation.

\textsuperscript{24}A perspicuous statement of this can be found in the works of Peirce: “We first see blue and red things. It is quite a discovery when we find the eye has anything to do with them, and a discovery still more recondite when we learn that there is an ego behind the eye, to which these qualities properly belong”; Peirce (1958a, 8.144), emphasis original.

\textsuperscript{25}An informed discussion is provided by Wall (2000).

\textsuperscript{26}Sensations were taken up with great enthusiasm by the so-called sensationist philosophers who hoped to put philosophical empiricism on a firm footing. They were a predominantly French group, including Condillac, who held that we get all our ideas through the senses. Locke is sometimes counted a sensationist, or sensualist, in opposition to realism.
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This ‘sensationalist’ approach offers some promise at the start. It affirms the robust qualitative difference between sounds, colours and smells, for example. Healthy humans simply cannot confuse the scent of a rose for its colour. Sensationalism also advises some refinements of the traditional taxonomy. It is doubtful, for instance, that sensations of heat and cold should be ascribed merely to touch. It is not at all necessary to touch a solid object (to be conscious of any pressure sensations associated with physical touching) in order to feel hot or cold or even to locate a source of heat. Conversely, as Aristotle already noted, objects which are neither hot nor cold do not elicit any sensations related to temperature. A distinct sense of warmth or heat is thus called for.

Some complications arise with smell and taste. These are not well separated and a decision has to be made on how a clear division of taste and smell should be drawn. Strict use of sensations—using criteria which have to do only with the feel of the sensation—shows its limits here because the fact that many foods become unidentifiable when the nose is blocked should be irrelevant if only the ‘phenomenal feel’ is used. But the really deep water, where our familiarity with our own sensations is too slight to be decisive, is reached as soon as touch is considered.

There is a bewildering array of what might be classified as separate qualities of touch. Although there is no obvious objection to collecting many different surface qualities (hard, soft, rough, smooth, sticky, oily, sharp, etc.) under one sense, identifying objects by touch in fact depends on a great variety of bodily affections. One example is the great tactile difference between plastic and metal which can be seen to follow mainly from the large difference in the thermal conductivity of the two substances. And touch traditionally offers not just surface qualities but also shape, size and weight. The judgement of these inevitably involves some movement or effort, and sensations of these seem to be additional to those of simple touching. Furthermore, the judgement of how hard an object is, or how heavy it is, is influenced by sensations of strain or pressure bordering on and going into pain. The sense of touch becomes a most complicated sense when it is realised that many of the sensations experienced in the touching of objects are not confined to the bodily boundary traditionally considered the locus of touch.

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27Synesthesia is not a confusion but a sensory association. Hallucinations also elicit sensations, apparently in the absence of a suitable stimulus, but this is not a confusion of sensation types.


29The classic illustration of this is the blind man’s stick. The feel and the locus of touch
Most importantly, the identification of many of the tactile qualities of objects depends on the agent’s activity, and reaching out and touching something feels very different from the subjective experience of being touched. A well-known statement of this is found in J. J. Gibson’s *Observations on Active Touch* where he complains that “the ‘sense of touch’ has been studied by sensory physiologists only as a passive or receptive channel”\(^{30}\). This article is heavily cited in the psychological and even philosophical literature. The irony in the need to point out, in a scientific context, the importance of the activity of the perceiver is significant in the way it testifies to the dominance of empiricist and sensationalist doctrines. As we have seen, it was common sense in the medieval period, and might be evident even now, that using the senses is a reciprocal exchange and perceiving is, as Alva Noë puts it, *enacted*\(^{31}\).

The general notion that sensations (or in the language of Lockean representationalism, ‘ideas of sense’) are simply presented to the perceiver is widespread, but a typical statement occurs in Berkeley when he says that

> whatever power I may have over my own thoughts, I find the ideas actually perceived by sense have not a like dependence on my will. When in broad day-light I open my eyes, it is not in my power to choose whether I shall see or no, or to determine what particular objects shall present themselves to my view; and so likewise as to the hearing and other senses, the ideas imprinted on them are not creatures of my will.\(^{32}\)

This is misleading, at least for touch, since touching is something we do and separating our contribution from any “ideas imprinted” is non-trivial. Still, whatever the merits of this theory of passive sensing might be, one may always attempt to at least catalogue various kinds of sensations, and postpone investigations of the role of learning and how attention is directed. An inventory of sensation types might already be enough to classify the senses.

An enormous experimental effort to tie down sensations with elaborate—and highly artificial—arrangements for testing the discrimination of small

\(^{30}\)Gibson (1962, p. 477).

\(^{31}\)Noë (2004).

\(^{32}\)Berkeley (1975, p. 85). The extent to which this is right for vision can be debated and some remarks are offered in chapter 6, but the story is clearly too simple for touch and perhaps other senses. Elsewhere, working generally in the context of the Book of Nature trope for his symbolic model of perceiving, Berkeley limits the perceiver’s role to attending to and interpreting the signs that are seen. See Bradatan (2006).
changes in external stimulus and separating complex sensations into ‘atomic’ components due to simple stimuli eventually led to a resigned despondency regarding the value of this approach. Edwin Boring, an eminent historian of experimental psychology, even went as far as writing epitaphs for eleven sensory qualities associated with the body.\textsuperscript{33}

The trouble is that although for vision and hearing it is relatively easy to build elaborate models of perceptual discriminations buttressed by numerical and statistical methods and spatial metaphors (the three ‘dimensions’ of hue, saturation and brightness for colour being but one example among an array of competing models\textsuperscript{34}), the procedure does not carry through to all sense experience. No amount of statistical and experimental sophistication has so far helped to overcome the fact that once we go beyond iconic cases, such as colour and pitch discrimination, our experience is inconstant, affected by moods and other factors, and in some cases also difficult to express verbally or even to indicate externally. Furthermore, although it might be surprising in the context of the stubborn blueness of blue and redness of red, the enjoyment and awareness of most, if not all, of our sensations is modified by learning and subject to significant changes from varying patterns of attention or neglect.

It is not surprising, then, that experimental subjects often report what they think they are expected to feel or struggle to express their experience in vague similes and analogies. Gibson’s remarks on the problem are relevant:

\begin{quote}
The great contributors [to making an inventory of sensations] were Helmholtz, Wundt, and Titchener, upholders of the conviction that sensations are converted into perceptions by past experience or memory, not by innate powers of the mind. They had to make an inventory because the inputs of the receptors were the sole raw data for any process of perception they could conceive other than a mysterious one.

It is fair to say that the effort failed. No inventory was exhaustive. The qualities of sensation within the five modalities of exteroception faded off into unreportable vagueness, and even the five modalities were compromised. There is today no accepted list of modalities and the number of senses given in textbooks varies from
\end{quote}

\textsuperscript{33}Boring (1942, pp. 563–564).
\textsuperscript{34}An exhaustive account of the modelling and its problems including the relevant history of ideas on colour spaces is presented by Kuehni (2003).
six to a dozen or more. The reason for the persistent naive belief in five senses is another matter entirely. There are five familiar modes of external attention.\textsuperscript{35}

This leaves the traditional five senses (in their \textit{active} aspect as listening, touching, etc.) as ‘modes of attention’ which we cultivate socially. They might be called, following Matthew Nudds, ‘psychological kinds’.\textsuperscript{36} If that is all they are it may be supposed that a society can, collectively, redirect its modes of attention as it adopts changing usage in language or exchanges modes of dress. There is no count of the senses as such, or better, we can count as many as we please.

It may now seem that the problem of classifying the senses on the basis of qualitative distinctions drawn from immediate experience has not been properly posed. No one is faced with bare qualities. Sensations come and go, they are distinctly located, some are correlated, and so on. The physiologists and psychologists also never thought to consider sensations as such—they always took sensation to be a response to a stimulus and searched for reproducibility, discrimination (such as mean noticeable differences) and other measurable parameters.

Before considering how sensations may be related to type of stimulus and other objective factors, another complication must be added to the lack of definiteness encountered in reports of subjective experience. Discussions of subjective states and sensations, be they in the psychological or philosophical context, often presume certain theoretical commitments. Empiricism is just one example of these, and Berkeley’s portrayal of sensation as an involuntary subjective response to something (the act of a spirit in his case) comes pre-packaged in a metaphysical system and an ontology of experience. The insistence on specifying an appropriate physical stimulus can be another version of the passive response story and, as we shall see, the presence of complications arising from the subject’s efforts and history creates difficulties not just for this stimulus–response approach to the counting problem but for a clear understanding of sensations as such.

Questions which directly arise include whether sensations have to be \textit{consciously experienced}, how they are to be related to physical states of the body

\textsuperscript{35}Gibson (1968, pp. 48–49). Gibson uses ‘modality’ almost synonymously with ‘sense’ and ‘exteroception’ as a technical term for a sensory system which serves in perceiving what is external to the body.

\textsuperscript{36}Nudds (2010a).
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or brain, whether they are indeed identifiable or separable, and so on. There is ample room for sceptics to argue that even saying what a sensation is is just too difficult to make the term useful and to advocate theories of perception in which ‘sensation’—in any of its variant forms as ‘idea of sense’, or ‘phenomenal feel’, or ‘quale’, or something else—becomes superfluous or even unmentionable. Before any of these matters are considered, the other three criteria need to be brought into the picture.

2.1.2 Organs

It is easy enough to come up with criteria which could be set down in addition to qualitative differences in sensations. We have already noted that the organs associated with the head senses are easy to identify and, following Armstrong, it can be asked: “What is our concept of a sense-organ? One mark of a sense-organ is obvious: it is a portion of our body which when stimulated produces a characteristic range of perceptions”. Identifying and classifying sense organs is the basis for important insights into the counting problem.

As soon as the physiological function of the nerves and brain in perception is recognised, it may seem natural to base studies of perception on anatomical and physiological studies which identify and classify different types of sensory organs and receptor cells and the associated groups of nerves.

To begin with, this approach can also reinforce some of the traditional understanding. Eyes and ears are very clearly identifiable organs and the optic and auditory nerves are, crudely judging by size, important pathways to the brain. Pursuing this approach further shows neurophysiology to be a revelatory study.

The human nervous system is exquisitely intricate and much of the body is enervated in some way. Considering this without prejudice undermines definitions of sensing as perception of things and events outside the physical body. Although it is true that some sense organs are oriented in ways that facilitate interaction with the bodily environment, there is no unproblematic way to define ‘external’ in connection with sense perception since conscious experience typically depends on not only collecting data about physical objects beyond the boundary of the skin; it is founded on the experience of embodiment, i.e.

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37 Examples to be discussed include Keeley (2002) and Gibson (1968).
38 Armstrong (1968, p. 212).
bodily self-awareness. Physiological investigations are not only useful for elucidating the detailed mechanisms underlying the functioning of organs such as eyes and ears, they also reveal the sensory aspects of bodily processes—most importantly the perceptual processes involved in moving and maintaining position and posture. Hence it is not surprising that new senses have been added to the traditional five by physiologists investigating nerve functionality.

A number of different taxonomic issues arise from the new discoveries and it is not too much to say that confusion and disagreement generally follow. The simplest and most direct approach might seem to be to classify the organs or receptor cells and use this as a basis for counting the senses. This, however, only shifts the taxonomic problem to a new domain, that of biological structure and functioning.

A couple of examples of the kinds of decisions that have to be made are appropriate. Firstly, it is not difficult to argue that we have not one but two distinct systems for vision—one adapted for daytime colour vision and the other for nocturnal vision. It is true that these share an organ, but they work differently and need not have evolved concurrently. Should we count one or two vision systems? Animals with multiple vision systems not sharing the same eyes are not unknown, so answering this question is not as easy as may first seem. Further, there are three kinds of cones, the photosensitive cells needed for colour vision. Are there multiple colour organs?

In a similar vein, cutaneous sensations of hot and cold are actually obtained from two different kinds of receptor cells—one only for hot, the other for cold. Are these then two senses? And are they separate from the senses we use to detect the relative warmth of internal organs? The suggestion that, for the case of hot and cold, the qualitative likeness or continuity between the sensations can be used to decide only reintroduces a reliance on the subjective experience, and sooner or later this poses problems related to the partiality of our acquaintance with our own sensations.

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39 The role of the body and the importance of sensorimotor skills is emphasised by Noë (2004), but the importance of these factors is already made clear in the work of Gibson (1968). A classic statement of the importance of embodiment is by Merleau-Ponty (2002).

40 On such considerations see Ings (2007), especially his chapter 9.

41 Again, answering is not trivial once it is noted that individuals who are totally red-green colour blind can distinguish some colour values at dusk which are indistinguishable for them in daylight. For information in various vision systems and problems with them see Ings (2007).

42 This was well-known already in the 19th century. See Alrutz (1897).
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The neurophysiological approach left to itself generates very long lists of senses served by highly specific organs. Vision uses four receptors, taste four or five,\(^{43}\) touch (cutaneous or superficial pressure) an apparently indeterminate number,\(^{44}\) smell a bewildering array of specialised cells numbering in the thousands, and there are many more left to count when the other senses are examined. If this process is followed to its logical conclusion, the number of senses that can be distinguished and counted seems to be limited only by the skill of the anatomist.

The problem here is evidently the insistence on using biological structure and functioning exclusively, and the general response is to group various receptors into systems—often called sense modalities—based more or less on the list of traditional senses. To this list are usually added a few new members but there is no clear agreement on what these should be. Nor is there any easy way of resolving these issues.

While this procedure may certainly be adequate for the scientist or the doctor needing to treat certain impairments, it is not particularly helpful for the understanding of philosophical aspects of perception. It might be hoped that neurosensory impairments may, for example, allow us to isolate what information or what aspects of sensory experience are furnished by certain parts of the sensory-nerve-brain system. The trouble here is that some sensory disturbances have effects so far-reaching—involving not just memory and time perception but also the sense of agency and self—that they implicate in perceptual functioning all sorts of things which might be hoped to be quite separate.\(^{45}\)

The discussion thus far of subjective experience and bodily organs has evidently left out one important—some might say the most important—way of resolving taxonomic issues. The objects of perception have not been discussed explicitly. These are considered next.

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\(^{43}\) Taste may yet be revealed to be more complex, with discriminations of the taste of fats reported recently.

\(^{44}\) Gibson mentions nerve “terminals [. . . ] of many sorts, not easy to distinguish”—in Gibson (1968, p. 106)—while in an authoritative textbook of human physiology it is explained that “at least six entirely different types of tactile receptors are known, but many more similar to these also exist”; Guyton and Hall (2000, p. 540). The situation is not helped by the observation that some kinds of receptors yield sensations of pressure, warmth, pain, etc. Incidentally, free nerve endings are associated with pain.

\(^{45}\) Interesting case studies are considered by Rosenfield (1992).
2.1.3 Properties of Objects

Except for extraordinary occurrences such as hallucinations, the workings of the senses depend on external stimulation by an object or, speaking more generally and loosely, objective factors in a set of circumstances. Since classifying the senses according to some individuation of objects is, on the face of it, simply shifting the problem to the way we group objects, what is usually done is to classify properties or qualities of objects. These properties and qualities are of course sensory qualities such as colours, physical properties such as hardness, characteristic sounds emitted by objects or in natural processes (winds whistle and brooks burble), and so on.

To make progress with classifying various stimuli, what is called for is a description of physical reality and hence physics becomes relevant. It is soon noticed when some physical interactions are investigated that the stimulus can be divided into distal and proximal components. The classic examples here are light as a wave or stream of corpuscles and sound as a pressure wave, mediating between the source of light or sound and the perceiver’s organs. Going further, the methodological principles of physics advise, or at least historically have advised, a mechanistic reduction to quantitative comparisons between theory and measurement. Using this methodology the great variety of sensible properties can apparently be reduced to a small set of physical properties or forces. It can then be asserted that ultimately all physical interactions are to be described as structured exchanges of energy and that the structure of these exchanges is what is called information.

It is not immediately clear how this is or could be relevant to classifying the senses. Indeed in investigating the proximal stimulus, it would seem that the nature of the stimulus is quite irrelevant and what matters is the part of the nervous system stimulated. This is reflected in Müllers law of specific energies according to which stimulation of the specialised nerve pathways always results in the same sensation which the nerve normally excites in the perceiver. Examining this historically, however, shows that there was rarely

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46 There are other options, such as using dispositions or dispositional properties of objects, but these will not be discussed. An older substitute for modern sensory qualities such as colour and hardness which covers some aspects of dispositional accounts is the medieval talk of ‘powers’ or ‘virtues’ still reflected in the terminology of Boyle, Locke and Reid. See Woolgar (2006) but note also how important these terms are still in Locke (1977).

47 This can be asserted even without even detailing the historical process of successful reductions. For an example see Stoffregen and Bardy (2001).

48 For details see Boring (1942). Helmholtz also offers an introductory exposition in von Helmholtz (1968c).
any doubt that the stimulus matters and that it can be described independently of the sensory experience which it elicits in normal perceivers. Müller’s law may help to answer some questions about the organisation of the nervous system, but under normal circumstances what is important is that mechanical pressure is one stimulus while electromagnetic radiation is a different one. If we examine the classes of physical interaction between the perceiver’s organs and the external environment (or, more generally, the proximal stimulus to the organ—since these organs may be internal to the perceiver’s body), we find only a few that really matter: electromagnetic interactions, mechanical interactions and chemical interactions. This is already a classification of the senses.

The problem with this is threefold. Firstly, in contrast to the approaches which emphasise sensations and organs, the traditional enumeration of the senses, even for the iconic cases of vision and hearing, becomes entirely irrelevant when a description of the stimulus derived from physical theory is taken to be fundamental. If only the nature of the stimulus is considered, then the feeling of heat on the skin exposed to the sun should be considered to be a form of vision. The fact that eyes are optical instruments which create images is of course relevant to what information they can make available, so there may be good arguments for separating seeing from feeling radiant heat, but these arguments are not conclusive since there are many kinds of eyes, some of which do not form images, and the fact that vision is directed is not decisive either, since feelings of radiant heat can also be used to locate the source of the stimulus.

Secondly, it is not clear from the determination of the stimulus what the response might be. For example, the feeling of hunger may be elicited by chemical or mechanical processes or a combination of both and this has to be determined. A protocol for associating subjective experience with stimulus has to be devised. This is traditionally the domain of psychophysics but since this inevitably reintroduces sensations into the investigation the problem of publicly reporting sensations is not overcome—it merely resurfaces.49 So although one can insist that the set of stimuli is known and classified in an orderly way, devising a useful taxonomy of the senses—useful in that it can serve

49It is possible to insist that sensations, or any aspect of subjective experience, need not enter the picture if brain states are correlated to or even identified with subjective states, but at present such identifications play a heuristic role in science and when correlations are sought it is evident that neither correlate can be eliminated. For a coverage of the scientific background and some intriguing speculations see McGilchrist (2009).
to report experience and assess various disruptions or enhancements—remains work to be done. This problem only turns us back to the first two criteria, now with the added difficulty that we are trying to reconcile potentially large numbers of sensations and organs with a small number of stimulus types to get, presumably, a number which is a useful compromise.

Thirdly, there is the philosophically crucial question on the epistemic status of subjective experience on the one hand and of theoretical descriptions of the stimulus on the other. These two are demonstrably not only not equivalent but the necessary scientific valuation must be inverted in any approach which emphasises physical stimulus and claims that the variety or order in sensations is either irrelevant or not foundational. Science, as generally conceived, aims to classify phenomena and to supply a theoretical redescription. This has both explanatory and predictive value. Now while it is fair to say that comparing a theory to the phenomena which it is expected to account for is not simply judging theory against facts, the basis of science in observation, experiment and measurement does not need to be argued for. Although it is possible, even likely, that scientists faced with a conflict between a well-established theory and some novel kind of measurement will seek out systematic errors or unnoticed complications in the experimental arrangement, continued conflict suggests that the theory and not the measurement should be abandoned. At the very least, the theory must be augmented to deal with any anomalies.

The point here is that descriptions of stimulus relevant to classifying the senses are theoretical descriptions insufficient in themselves; if the variety and structure of sense experience is not reflected in the description of the stimulus then the theory is evidently incomplete. This is not a problem for the physical sciences unless these claim to subsume all the sciences under a general description of the interactions of matter, but it is a problem for accounts of perception which rely exclusively or mainly on the theoretical apparatus of the physical sciences. If there is no explanation in a theoretical description of a stimulus why, say, light with a wavelength 650 nanometers is seen as red whereas light with a wavelength just a little longer is invisible but elicits sensations of warmth on the skin, then this is not some strange problem to do with subjective experience but a sign that the electromagnetic wave theory is inadequate in predicting how a given stimulus will be perceived or even whether it is perceivable. It is not rational under these circumstances to claim that it is the experience which should be ignored, even if it can be claimed that for
some limited purpose (such as predicting how the light will interact with the surface of a metal) the theory in hand is sufficient.\textsuperscript{50}

This problem of theoretical insufficiency is not particularly interesting in itself. It is worth noting when exaggerated claims for approaches based on scientific theories need moderating, or when hopes of what might be achieved in the future are confused with what is already known—or heuristic suppositions substituted for facts—but it is useless to argue from the state of current theory that it will always be deficient in some way. However, the inversion in the valuation of fact and theory is troublesome in more ways than simply obscuring actual ignorance. This is because the strategy itself is ultimately self-defeating.

To see this, it is necessary to go some way into the detail of the theoretical pictures offered. The general claim is that every theoretical account relies on a description of its theoretical objects. A theory is not merely a mathematical algorithm for computing the results of measurement. It offers analogies with processes known independently of the specific theory.\textsuperscript{51} Now while this works admirably when one set of phenomena is supplied with an explanation by analogy with another set (as the behaviour of light is explained by either wave or particle motion), care has to be taken when perceptual experience as a whole is what needs explaining. The trouble is that the analogies used in building theoretical frameworks will either come from a limited subset of the phenomena of experience or they must come from somewhere else entirely.

When the whole range of experience is the object of inquiry this looks like a dilemma. Either the field of experience is divided and one part privileged over another, so that the privileged part supplies the basis for explaining the rest, and it must then be asked how that which has been privileged is itself explained or why it needs no explanation, or the source of the analogies must be sought outside experience and then it must be asked what this source is. Since stating the problem thus in very general terms may not even make it look convincingly like a real problem, it will be illustrated by examining the historical strategy of relying on a distinction among the qualities and properties of physical objects which is known as the distinction between the primary and secondary qualities of objects.

\textsuperscript{50}Using similar arguments Peirce concluded that “it is the business of a physical theory to account for the percepts; and it would be absurd to accuse the percepts—that is to say, the facts—of mendacity because they do not square with the theory”; Peirce (1958a, 8.148).
\textsuperscript{51}These claims regarding theories are so well understood in scientific practice that it is superfluous to argue for them in any detail. An elementary but admirably clear picture is given by Feynman (1992).
What can be shown is, firstly, that there is no principle according to which this distinction has in the past been drawn reliably. Feelings and personal intuitions have been used, flights of fancy and imagination too, but there is no self-evident division in the field of experience which supplies the dividing line for this distinction. When it is not purely \textit{ad hoc}, the way that it has been drawn relies on some \textit{traditional ideas about the senses} bolstered by metaphysical axioms. Secondly, it can also be shown that the source of the analogies used historically for theory building is not external to experience but an integral part of it. Recognising this and those particular senses whereby the relevant phenomena enter experience puts not only the traditional ideas about the senses in question, it renders the metaphysical axioms needed to anchor the privileged status of those theoretical descriptions dubitable.

The need to say so much on the third criterion—physical stimulus—is a clue to where the main philosophical problems lie. The reliance on stimulus introduces a dissonant note into the taxonomic problem. It has pulled, at least historically, in the opposite direction from the multiplication of senses advised in studying organs and isolating sensations. Insisting on the priority of stimulus amounts to elevating a theoretical picture of the real world above a phenomenology of our lived experience, and to using the theory to recast this experience in forms that deprecate compelling divisions in it.

It is very difficult to see this insistence as a mistake in the context of theories based on analogies which have some scientific currency and the common sense appeal generated by circulating the key ideas widely in popular culture, but it is easier to notice it as such in a historical setting. For an excellent example we need look no further than Reid’s epistemological scheme with its neat division between sensations and perceptions, its trusting reliance on a picture of the world “in accordance with the state of physical science at the close of the seventeenth century”, and its systematic association of sensations with hidden properties of objects or even complex physical processes.

As a first approach to this conglomeration of problems relating to the status of theoretical descriptions of the physical stimulus, a simple illustration of how primary qualities have a tendency to disappear from objective reality can be obtained from considering the fate of just one of Reid’s primary qualities: hardness.

\footnote{Arguments against this distinction and Locke’s justification of it usually owe a debt to Berkeley. For an account of the various difficulties in a modern context, see Savage (1970, ch. 10).}

\footnote{Whitehead (1925, p. 79). Whitehead is referring to Locke.}
2.1. **CRITERIA FOR COUNTING SENSES**

Recalling that Reid’s epistemological scheme relies in part explicitly on our direct knowledge of the properties of objects—they really are extended, they have shape, they are hard or soft and so on—and on our sensations acting only as representative signs of those and other qualities and properties of real objects, Reid can be asked how we perceive this primary quality called ‘hardness of bodies’. Since Reid accepts, indeed doggedly insists on the fact that subjective sensations in no way resemble the qualities of bodies, he is committed to adopting a version of the doctrine of primary and secondary qualities so that he has at his disposal two languages or two separate descriptions. One is needed to describe our representations, i.e. the sensations, and the other to describe the objects which cause those subjective experiences.\(^{54}\)

The debate over the philosophical validity of the distinction is interesting in itself, but one of the advantages of going back to Reid (as opposed to relying only on modern opinions) is the clarity with which one can see that the doctrine is built on a scientific quicksand.\(^{55}\)

\(^{54}\)Reid credits Descartes, Malebranche and Locke with the revival of the ancient doctrine on qualities; Reid (2000, pp. 62 & 73). Incidentally, Locke’s argument that primary qualities of bodies are those that are retained upon continued division—which simplifies Robert Boyle’s corpuscular philosophy—is clearly faulty in the context of modern science. See Alexander (1985) for the historical context. Despite what Reid says, the modern doctrine actually arose with Galileo and was adopted by Descartes, Boyle and Newton as part of the new mechanical philosophy. Locke was a close associate of Boyle and sought both to provide philosophical support for Boyle’s scientific views and to make them generally understood. Again see Alexander (1985) for historical details. Alexander is strenuous in advocating the importance of Boyle’s influence on Locke but is not quite reliable on the subtlety of Boyle’s philosophy: Boyle’s own views on qualities were not simplistic and he was both cautious and open-minded; see Henry (1994). In the scientific context (as opposed to the context of Locke’s *Essay*) the division was not based on an epistemological analysis but on a theoretical picture judged mainly on its technical merits, including the ability to apply powerful new mathematical and geometrical methods to the resulting models.

\(^{55}\)The theoretical pluralism of modern science and qualitative variety of models that scientists employ in theorising need not be presented in any detail here against Reid, since he offers a version of scientific literalism common in the eighteenth century and easily seen to be mistaken when theoretical progress (for hardness it is progress in solid state physics) is noted. That is the main advantage of surveying the historical development of ideas on the distinction. It is always a mistake, and a lamentably common one, to accept a theoretical picture of what underlies some set of phenomena to be a faithful reproduction of real processes, as if our present-day theory was the last word of explanation and our understanding complete. Duhem has criticised Copernicus, Kepler and Galileo for thinking that their theories were literally true (rather than mathematical contrivances adequate for saving certain phenomena). See Duhem (1969). With the multiplicity of non-overlapping theoretical pictures and formalisms available in modern science, it is easier than it might have been earlier to reject the idea that theoretical descriptions should be taken literally.
2.1.3.1 Hardness

Is hardness a primary quality by the standards of Reid’s account of perception? Do we indeed perceive the intrinsic hardness of bodies directly in touching? There are reasons to doubt it. To a cursory touch all solid objects feel equally hard but this amounts to little. The sensation we feel is markedly dependent on how hard we press and the phenomenology of touching is complicated by dynamic aspects. A strong gust of wind can feel ‘harder’ than an encounter with a solid object. A pressurised jet of water can not just feel hard, it can cut through flesh and bone, even steel. Yet neither air nor water are intrinsically hard. Further, we know that diamond is harder than quartz, but it is impossible to determine this by touching them. In fact, by direct perception of hardness Reid appears to mean a kind of deliberate but moderate touching. This produces a reactive pressure which we interpret as a property of the object. If the pressure is too weak we become conscious of a sensation of pure contact on the surface of the skin, if too strong we are aware of our effort to press or of pain. It is hard to see how all this makes what we apprehend as hardness any more like the real quality of the body than the corresponding cases for secondary qualities such as colour or warmth. In all cases of perception, under favourable conditions, we attribute the relevant quality or property immediately to the object and the way we distinguish primary and secondary qualities has more to do with preconceptions about what the world is ‘really like’ than with the facts of perception.

Insisting that hardness is perceived directly because it is a primary quality leads Reid into confusion. In section II of chapter V of the *Inquiry*, entitled *Of Touch*, he states that:

> When the parts of a body adhere so firmly, that it cannot easily be made to change its figure, we call it hard; when its parts are easily displaced, we call it soft. This is the notion which all mankind have of hardness and softness: they are neither sensations, nor like any sensation; they were real qualities before they were perceived by touch, and continue to be so when they are not perceived.

56Reid does note a variability of sensations of touch and cites the pain felt when “a man runs his head with violence against a pillar”; Reid (2000, p. 56).
57Reid (2000, p. 55).
The cohesion of the parts of a body with more or less force, is perfectly understood, though its cause is not: we know what it is, as well as how it affects the touch. It is therefore a quality of a quite different order from those secondary qualities we have already taken notice of, whereof we know no more naturally, than that they are adapted to raise certain sensations in us. If hardness were a quality of the same kind, it would be a proper inquiry for philosophers, What hardness in bodies is? and we should have had various hypotheses about it, as well as about colour and heat. But it is evident that any such hypothesis would be ridiculous.\(^{58}\)

The incoherence of the position is evident here. Firstly, it is already a hypothesis that hardness has to do with the forces which hold the parts of an object together.\(^ {59}\) And it is a proper inquiry for scientists to devise models of, for example, crystal structure, which explain not just hardness, but brittleness, ductility, elasticity and other qualities. Surely hypotheses are needed to explain the differences between graphite and diamond, not to mention wood, rubber and glass? The problem arises with the idea that we know ‘naturally’ that objects are made of parts which cohere, but it is not at all obvious that we do. It might even be argued that if something is hard (at least hard to break or scratch) then that is reason enough to believe that it is not made of parts at all! Only experience with how the hardness of bodies actually relates to their other properties, such as brittleness, will eventually convince us that even the hardest object can be separated into parts.

Hardness exposes the fragility of Reid’s position on any direct apprehension. If our sensation of hardness is like our sensation of colour (purely in the mind although corresponding to a real quality), then we do not directly perceive hardness after all. Hardness joins colour and warmth among sensations which merely signify unknown qualities of bodies.\(^ {60}\)

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\(^{58}\)Reid (2000, p. 61).

\(^{59}\)Reid normally uses ‘hypothesis’ in a pejorative sense but that is immaterial in this context.

\(^{60}\)It might be supposed that these objections to counting hardness with other primary qualities can be sidestepped by speaking instead of solidity, but the objections stand and, furthermore, by talking about “more or less force” Reid is pointing to hardness.
2.1.3.2 The Parsimony of Positivism

This retreat of primary qualities back ‘into the mind’ shows how difficult it is to arrest a slide into abstract positivism. It might be argued that extension and duration are always needed. However, even if psychological aspects of the variability in the perception of distance and time are ignored, the way that these enter modern theories makes the relation between direct perception of distance and of the passage of time, and what the world is ‘really like’, extremely tenuous. We can not rely on our contemporary physical sciences: the theories of science are far too heterogeneous to be useful for such literal descriptions of reality and there is no guarantee that any future theories will require any particular primary quality in their formulation.

This suggests that a common sense view of the physical world which is furnished with objects that occupy space and can move, that have shapes and sizes, that may be hard or soft, rough or smooth, etc., is not as solidly based on science as may be required.

It is instructive to compare Reid’s common sense realism with a slightly later opinion so that the role of the distinction between primary and secondary qualities can be clarified. Helmholtz, in an 1878 address called *The Facts of Perception*, gives an admirably clear statement of how our sensations function as signs:

> What information [...] can the qualities of [...] sensations give us about the characteristics of the external causes and influences which produce them? Only this: our sensations are signs, not images, of such characteristics. One expects an image to be similar in some respect to the object of which it is an image; in a statue one expects similarity of form, in a drawing similarity of perspective, in a painting similarity of color. A sign, however, need not be similar in any way to that of which it is a sign. The sole relationship between them is that the same object, appearing under the same conditions, must evoke the same sign; thus different signs always signify different causes or influences.

To popular opinion, which accepts on faith and trust the complete veridicality of the images which our senses apparently furnish of external objects, this relationship may seem very insignificant. In

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61 Another apparently indispensable quantity in science is energy, but it is entirely abstract and does not correspond to any sensation.
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truth it is not, for with it something of the greatest importance can be accomplished: we can discover the lawful regularities in the processes of the external world. All natural laws assert that from initial conditions which are the same in some specific way, there always follow consequences which are the same in some other specific way. If the same kinds of things in the world of experience are indicated by the same signs, then the lawful succession of equal effects from equal causes will be related to a similar regular succession in the realm of our sensations. If, for example, some kind of berry in ripening forms a red pigment and sugar at the same time, we shall always find a red color and a sweet taste together in our sensations of berries of this kind.\(^\text{62}\)

Helmholtz, like Reid, stresses the lack of resemblance between our sensations and the real processes which produce them. However, Helmholtz is far more modest here than Reid in what we are expected to be able to understand about the real world. In fact, all that we can know is contained in regular associations between our sensations. To ask what the world is really like becomes a problematic, perhaps meaningless question and our knowledge of the real reduces to a more or less abstract calculus which connects sensations, or, more generally, what we somehow identify as specific sensed phenomena. It is not difficult to see how this view eventually led to scientific positivism.

A thoroughgoing positivism, which flies in the face of common sense beliefs about the qualitative nature of reality, is unlikely to have appealed to Reid who took pains not only to accommodate direct apprehension of primary qualities into his worldview but also to retain secondary qualities in the guise of objective, albeit occult, correlates for the sensations which act as signs for them. The point is, of course, that it is not enough to insist that sensations, while lacking resemblance to objective qualities, are signs for them. Accepting Reid’s epistemological scheme at face value and updating it with our increasingly abstract scientific theories effectively ruins its common sense appeal, and leaves us with a real world which can only be imagined by borrowing qualities from private sense experience and illicitly exporting them into a reality which must remain, according to the scheme, qualitatively occult.

If relying on classifying the properties and qualities of objects runs the risk of sliding into an unbelievable positivism, using the objects themselves, as

\(^{62}\) von Helmholtz (1971, p. 372); also given in a different translation in von Helmholtz (1968a, pp. 207–231).
already mentioned, seems even worse because it returns to an uncontrollable growth in the number of possible senses. It appears on the face of it reckless to suggest that we have a sense for perceiving cats and another sense for teapots, and so on for trees, for pools of water, for flames, etc.\(^6\)

Before considering any attempt to square up classifications of the senses which privilege the object or stimulus with those that rely primarily on sensations, one last criterion must be considered. This criterion is based on inference from observed behaviour. Not only is it useful in surmising what a perceiver might know when direct knowledge of sensations or organs is lacking, in some versions it also enriches the accounts of the stimulus.

### 2.1.4 Actions and Affordances

If someone looks in the right direction and then reaches out to grasp a teapot, it is natural to conclude that they saw where it was; if they miss, there is reason to think that something has gone wrong in perceiving its position or perhaps in executing the appropriate movement or even—against protests that they tried to pour some more tea—to question the intention informing the act.

This complexity in the possible reasons for failure illustrates the fact that the inference from behaviour to what is perceived is underdetermined, and hence must rely on analogy with instances where both the perceptual experience and the relevant behaviour are known more or less independently. Despite this, there have been attempts to bypass any consideration of subjective experience (the enjoyment of sensations and discrimination among them) in favour of relating stimulus directly to behaviour. These attempts do not have to be as doctrinaire as the classical behaviourism of Skinner and Watson, which occasionally denies the very existence of subjective experience, and paying close attention to behaviour can also lead to valuable insight into the process of perception. For now the key question is whether considering behaviour can help in counting the senses.

The results depend on how behaviour is construed and to what extent it is privileged in classifying types of stimulus or provocation. Reductive strategies

\(^{63}\)Simon Blackburn comes perilously close to saying this, not indeed in the context of counting senses but in glossing how they work together, when in comments on behalf of a correspondence theory of truth he asserts that “we are good at cats because our senses make us causally receptive to their presence or absence”; Blackburn (1984, p. 244). Presumably if we don’t notice some exotic animal then that’s because our senses are not receptive, as perhaps our eyes are not receptive in the ultraviolet part of the spectrum.
may tend to style all behaviour as movement and all stimuli, in common with some reductive descriptions of physical objects, as structured flows of energy or information. Strategies based on evolutionary accounts may strive to explain all behaviour as more or less directly motivated and explicable by the demands of survival and reproduction. In either case, counting the senses is only peripherally relevant to what is at stake and the role of perception need not be made explicit. As a contrast to this it is instructive to also consider briefly an alternative proposed by J. J. Gibson.\textsuperscript{64}

To begin with it should be acknowledged that examining behaviour is a promising strategy. We need to explain how we know where our hand is and which direction it should be moved in to grasp the teapot or to touch our nose. We need to know how it is possible to stand upright and walk. It is clear that extra senses informing the agent of the movement and position of the limbs are required. Not only are the senses required, the receptors and relevant nerve pathways have been identified and studied, so the whole picture looks quite consistent. This general approach can be extended by diagnostic studies of electrochemical brain activity and by interventions such as severing specific nerves or removing or disabling parts of the brain or sensory organs. What has in effect been done is to shift attention away from a specific physical stimulus (e.g. a blue flash of light) and direct it to the behaviour—in an inclusive sense—of the subject when engaged in some activity requiring perceptual skill (e.g. eating a meal).

Now what is not here being asked directly is what the world is like ‘qualitatively’. Nor is it really necessary—to begin with—to consider the stories of how we got an ability (i.e. evolutionary or ecological accounts of skills development as well as theories of learning), or even to consider mechanisms underlying an activity (such as causal theories of perception). What is of concern is only how good this is for classifying the senses.

No approach based predominantly on behaviour seems suitable for helping to classify the senses. The trouble is partly that the specific behaviours of a complex organism, such as we are, are not easily reduced to the pursuit of the biological imperatives associated with food, sex and shelter. A great deal of behaviour is thus mysterious, unless we have already identified its specific purpose, or adopt a reductionist agenda. It is also a non-trivial task to infer

\textsuperscript{64}Gibson’s views are presented mainly in two classic works; Gibson (1950) and Gibson (1968). His ideas went through considerable development during his highly productive career.
any kind of knowledge (whether conscious or not) from behaviour, and further complications arise from the fact that the senses may be used together or separately in the performance of any task. In cases of sensory disruption or deficit, one sense can even compensate for another when a specific goal is desired. In the face of such difficulties there is a tendency to talk of perception rather than sensing. This is one way to take up Reid’s distinction and to imagine that in talking of perception of what is ‘really’ in the environment all the problems associated with sensations vanish.

This too fails to be of much use if a coherent and logical system of sense perception is what is desired. Instead of a plethora of receptors and organs, or of sensations and vague feelings, the goal is now to organise our perceptions. Durie goes as far as saying that:

> The bottom line is that we make a mistake in concentrating on senses, and even in arguing about how many there are. Perception is what matters, and sensation is what accompanies it.\(^{65}\)

It is not difficult to see the problems with this. To begin with, there is no evidently sensible way to classify perceptions. No doubt we perceive hot and cold, hard and soft, smooth and rough. Traditionally these were all objects of the sense of touch and qualities of bodies. Should we now admit that we have a separate sense of smoothness? We perceive form—distinctly according to both Reid and Berkeley\(^ {66}\)—by touching and looking. This might suggest that we have one or two senses for shape, one or two for size, perhaps one or two for sharpness. Now there is little doubt that our behaviour is informed by all sorts of perceptions. A sense of foreboding may be ascribed to an animal that is apprehensive, a sense of joy to someone who skips along merrily, a sense of humour to one who is laughing. It is no objection to say that the relevant ‘perceptions’ are not accompanied by sensations; they most certainly are. The number of senses is no longer limited by the anatomist’s skill but only by the poet’s imagination, and a distinct sense is created as soon as we distinguish something new in our experience, at least if it is something which can affect our emotions and influence our actions.

Such apparently foolish extravagance in multiplying the senses according to the objects of perception (which is, by the way, tolerated in the ordinary use of the word ‘sense’) can be made more sober if it is insisted that only

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\(^{65}\)Durie (2005).

\(^{66}\)See Reid (2000, pp. 101–103), where Reid credits Berkeley with this discovery.
the perception of objectively real things is relevant. Such an objection leads almost inexorably back to reductive descriptions of physical stimulus unless an attempt is made to supply descriptions and explanations of specific actions and situations as is done, for example, in Gibson’s ecological approach to perceiving. This begins with the fact that the environment is structured and the objects in it furnish various ‘affordances’ to the perceiving organism. Thus one such object may be perceived as food, another identified as a suitable sexual partner; one surface can be walked on while another is seen to be a pond which we can bathe in. In this kind of world a rabbit that sees a flying hawk or an approaching wolf will sense fear, a fear which attends objective perceived danger and results in an effort to flee or hide.

The variety of affordances is limited only by the complexity of the organism and the range of interactions with its environment. For humans they would not only seem countless, but they can be created as we please through inventive modifications of our environment. Unless one embarks on classifying affordances and proposing mechanisms whereby compound interactions are built from elemental ones—which simply shifts the taxonomic problem away from the senses back to the properties of objects or the characteristics of our interactions with objects and situations—the growth in possibilities appears to be unstoppable.

Even if it is unclear whether classifying behaviours truly helps with the counting problem, some important insights emerge from considering this. These have to do with what constitutes ‘behaviour’ in the context of perception and here two distinctions need to be considered.

The first is between behaviour and action. Although it may be apparent that mere behaviour need not be purposive and intentional, movements informed by perception are goal directed, and in this sense meaningful. This is not to say that the motivation for a certain act has to be attributed to an individual organism or human agent—and indeed it is not in an ecological scheme such as Gibson’s—only that the act is to be explained as the fulfilment of a goal and that it can fail to serve its purpose. Such explanations are superfluous, even animistic, in cases where the perceiving agent or agency as such is absent.

The second distinction is between what the perceiving agent is aware of in acting, as against what they may be or can become aware of. Needless to say, our knowledge of our actions is incomplete, not just in that we do not become aware of everything that happens when we move an arm or say a word, but
also in that we do not comprehend all the effects of our actions, or the details of our reasons for carrying them out.

In formulating the distinction in this way, it should be clear that any difference between an act and what the agent perceives themselves to be doing depends on how well the agent has learned any skills which the act entails and how they pay attention to what they are doing and perceive the context of their action. So in attempting to classify perceptions according to behaviours, we find that even separating behaviour from perception is no simple matter. Doing this according to categorising criteria of behaviour as voluntary and active as against perception as passive, as the involuntary reception of ‘impressions’ or ‘ideas’, is unlikely to do justice to the dynamic play between a perceiving agent and the world. Berkeley’s assertion that when “I open my eyes, it is not in my power to choose whether I shall see or no, or to determine what particular objects shall present themselves to my view” is thus too crude. Since our knowledge of such objects is incomplete and amenable to revision, saying that what now feels to be something not subject to my will, or whim, must remain so, or even is so, requires positive proof. Berkeley is merely confessing a subjectivism in his doctrine.

From the foregoing it should be clear that behaviour is not an independent criterion which can overcome a lack of knowledge regarding the stimulus or indeed what is perceived, and of how perception occurs. Introducing behaviour can at best serve a comparative purpose so that the incompleteness of a subject’s awareness (or a temporary or pathological lacuna in it, as in cases of blindsight) may be discussed and understood in the terms normally reserved for deliberately acting agents—so that one speaks of what would be or might be perceived.

Furthermore, the sort of overt behaviour constituting gross movements or speech is also reciprocally undetermined with respect to the perceived object or situation. The incidental presence of particular movements or even vocal expressions does not imply that a perceiving agent is acting or even perceiving. Conversely, the lack of overt activity does not imply absence of perception. The most that can therefore be asked for is that behaviour is generally consistent with the perceptual abilities of the individual agent. Any inconsistencies require specific explanations, but what ‘consistent’ means is inevitably based on typical perceivers.

\[67\] Berkeley (1975, p. 85).
2.1. CRITERIA FOR COUNTING SENSES

2.1.5 Aristotle’s Problem

It was argued, on page 27 above, that it is misleading to credit Aristotle with the count of five senses and also suggested that Aristotle’s problem was not, as Brian Keeley put it, how the human senses should be counted. Moreover, a deep chasm between modern views and older traditions regarding the senses was indicated, and these old traditions stemmed partly from Aristotle. Before glancing at some of the new senses identified in scientific investigations, it is thus appropriate to say something about Aristotle’s purpose in his work on the soul.

From the discussion of the four main criteria whereby the senses are distinguished and counted, it is evident that none of the criteria stand alone and attempting to privilege them one by one leads to difficulties. Since it seems perverse to suggest that any of the four of sensation, organ, stimulus and behaviour are irrelevant to counting the senses, it is natural to seek a framework which gives each aspect its due and provides what might be called a systematic or even ‘cosmological’ account of the senses. This is Aristotle’s real problem.

The truth of this is revealed by even a cursory reading of *de Anima* and there is no need to go into detail, but Aristotle is seeking a satisfying, unified account of how our senses operate, indeed of how cognition works in general. This is a very difficult problem and it is no surprise that in following an empirically informed procedure Aristotle runs into inconsistencies and issues which cannot be satisfactorily resolved on the evidence at hand. The counting problem does arise for Aristotle but the philosopher is relatively relaxed about how many special senses should be counted, and offers an argument why five is cosmically necessary\(^\text{68}\) even as he entertains the possibility that there are only four (taste is a species of touch\(^\text{69}\)), or that touch might be considered as multiple senses.\(^\text{70}\) The priority is not criteria for counting but mechanisms and clear distinctions which can serve, eventually, to understand the varieties of perception.

It might be supposed that what Aristotle associates with each external sense can also be used in criteria for counting. But these criteria do not map neatly onto the four modern ones presented here. In Aristotle and the tradition following him, what belongs to each sense are the specific objects of sense (e.g. colour), the incidental objects of sense (e.g. a red teapot), the common sensibles

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\(^{68}\)Barnes (1984, pp. 675–677).


\(^{70}\)Barnes (1984, p. 672).
(a single object of a certain shape and size, etc.), the organs (e.g. eyes) and, in relation to specific mechanisms, the medium needed between, say, the visible object and the eye (the medium is the pellucid for light, the empty for sound, etc.).

It is a rather elementary error to think that our four criteria and, in particular, our distinction between sensation and stimulus can be grafted onto the ancient tradition. In fact, as we have already seen to some extent, it is this distinction which causes the main worries in the counting problem (should sensations be ignored? are there many senses or should we simply consider a unified flow of structured information?), and the particular problem of a slide to two incompatible extremes does not arise for Aristotle at all.

The attractiveness of a unified account is clear and in Aristotle’s system the organ, medium and object are not to be used as separate criteria, they all belong necessarily to sense. So if we have a particular sensation we should look for an organ, and given the mode of operation we should identify the medium. Only when we cannot use testimony to check that the sensation is the same—for animals and for people who cannot speak our language—then overt behaviour or gesture or cry might serve as confirmation that the individual in question feels a pain or sees something just as we do, but this is of as little use in individuating senses as the incidental objects such as cats or teapots are.

Aristotle’s schema for perception is explained clearly by Abraham Edel. For vision, the transactional nature of perception requires the presence of organ, medium, object, and that which makes perception actual, in this case fire:

One precondition is the eye, as part of the living body. The other is the surface of the object. The one is potentially seeing, the other potentially colored. In between is a continuous medium. This Aristotle identifies not as air, but as a finer substance shared by air, water, and the eternal fifth substance; he calls it the “diaphanous” or “transparent”. In this situation, fire serves to precipitate actualization, just as the striking does in hearing or heat does in digestion. At once the unified actuality is there. The eye is actu-

\[71\] Whether it is the proximal or distal stimulus is not very relevant, since what matters is that we describe the stimulus as physically real and use the language of theoretical physics, rather than a named sensation to specify it.

ally seeing, the object is actually colored, the medium is actually transparent. This energetic state of the medium is what Aristotle calls “light”. 73

The insistence on a systematic approach (in contrast to searching for and analysing individual criteria to help with counting or classifying) is as prominent in Reid as it is in Aristotle. This is one of the main reasons for listening to Reid. The other is that Reid sits on the near side to us of Descartes and Locke, and tries to give a unified account of sense in the context of a sharp division between subjective, private experience and a real, physical world which “hath a permanent existence, independent of the mind”. 74 Whether he succeeds or not is not as important as the way he goes about trying, and what really counts is his attempt to place the subject and the object in a systematic relation, denying neither an ineliminable role in perception.

The difficulty of disentangling the subjective and mental from the real and physical, or of fitting them justly together, is reflected in the taxonomic difficulty explained above: the tension between the multitude of sensations cultivated and identified in shared experience, and the descriptions of objects given in our best physics, with these two pulling in opposite directions when an explicit count of the senses is needed. This difficulty really does not exist for Aristotle. Instead, as Edel explains:

His definition of the psyche, cast in terms of potentiality and actuality, bypasses the dualism of body and mind. It opens the way to a full naturalism in which the continuities and differences of plant, animal, and human can be studied scientifically. That an actuality is a joint or single actualization or fulfillment of agent and patient (of the organism and the environment) makes it possible to see the phenomenal as qualities of the transactional situation rather than as locked away in a private mind. The relation between the phenomenal and the physical or physiological is captured in the Aristotelian relation of form and matter, which ensures a relative and nonreductive character in their distinction. 75

This transactional or relational framework for perception is a world away from those modern ideas about the causes and mechanisms underlying our conscious

74 Reid (2000, p. 43).
experience which deprecate the perceiver’s role to that of a patient, or pas-

tive subject. Recent attempts to revivify the perceiver, for example by Alva
Noë or some of those who explore the implications of brain plasticity,\textsuperscript{76} are

encouraging but they do not automatically help with the counting problem.

To make progress with counting requires three further steps. Firstly, to
be clear on what is being counted, secondly, to recognise that what we call
our senses are not independently functioning faculties of the organism, and
hence, not elemental modes of perception, and thirdly, to supplement the list
of perceptual modes so clearly incomplete in naive and traditional counts,
so that other modes can be considered and used to analyse and explain the
complex accomplishments which we call seeing, hearing, and so on. Only the
preliminary work for this formidable programme is attempted in what follows
and the counting problem may not have a unique or permanent solution. As
we shall see, however, even noticing that the traditional senses do not work
independently, and investigating what some of the less familiar senses yield,
can be extremely valuable.

\section{The New Senses}

Some impatience with the way the taxonomic problem has so far been pre-
sented might be understandable at this point. Common sense and practical
interest appear to have been sidelined. At least three issues can be raised.
Firstly, despite some talk of new senses, few examples which illustrate main-
stream science have been presented. Secondly, if it is true that the traditional
five are complex, then it is important to at least suggest better ways of di-
viding experience. Following from this, thirdly, it can be asked whether there
is really a problem here. Surely taxonomic issues are constant companions of
scientific inquiry; not only will they not go away but their presence motivates
further efforts. The last issue is too big for any concise comment—and indeed
it underlies the whole work—but some acknowledgement of the first two is now
needed and this is done most readily by offering a few examples of the new

\textsuperscript{76}A notable example here is Catherine Malabou, in Malabou (2008), but how well she
deals with issues arising from dualism is debatable.
2.2. USING ‘SENSE’ GENEROUSLY

Extra senses are easy to come by. Common usage offers a sense of time, a sense of space, a sense of place, a sense of well-being, a sense of danger, a sense of pain, and so on. Most of these expressions have multiple meanings, figurative uses and mixed associations. How they relate to scientific and philosophic studies is not easy to say, but it would seem that their respectability as senses on a par with seeing and hearing is questionable.\(^{77}\)

The answer offered to the question of how many senses there are very much depends on the context of the question. If the respondent becomes suspicious that the routine answer of five will not do, then they may even feign ignorance; if they are invited to be generous by an example, then a looser meaning of ‘sense’ can quickly swell the count. In the context of popular science, there is a tendency to try to impress the reader with spectacular numbers. Rivlin and Gravelle suggest a count of 17 or more without actually offering to list them.\(^{78}\) Durie opts for 21 as a “conservative number” or 35 as a more complete count, but quietly drops thousands of separate senses underlying smelling to arrive at these numbers.\(^{79}\) When the counting problem might make an unwelcome distraction we find, in contrast to large numbers, efforts to discuss the senses in a rigid framework of five even if what is being discussed strains this framework. Examples of this can be found in a special edition of *Scientific American* on the senses,\(^{80}\) in Jütte’s history\(^{81}\) which makes little room for the new senses of scientific investigation and none for traditions other than five, and in works

\(^{77}\)Another example, a sense of physical desire has been counted by Brillat-Savarin in his *Physiology of Taste*. He breaks with Aristotelian tradition to insist that the Author of Nature made Man entirely for two purposes (preservation of the individual and continuation of the species) so the senses only serve, in effect, the ‘lower’ faculties of nutrition and reproduction. He insists that this sense of physical desire (which presumably means sexual arousal and pleasure) is not part of touch. Indeed “the two have nothing in common; the organism [sic] of the sixth sense is as complete as are the mouth and eyes; and it has this peculiarity, that although both sexes are fully equipped to feel sensation through it, they must be joined together before the purpose Nature has set itself can be attained. And if taste, whose purpose is the preservation of the individual, is indisputably one of the senses, the same title must surely be given to those organs whose function is the preservation of the species”; Brillat-Savarin (2008, p. 17). This may sound quaint but the idea of purpose or function is perfectly respectable in an ecological context and it is hard to see why one should argue against the genitals as a sense modality attuned to highly specific and important affordances in a Gibsonian framework.

\(^{78}\)Rivlin and Gravelle (1984).

\(^{79}\)Durie (2005).

\(^{80}\)diChristina (2006).

\(^{81}\)Jütte (2005).
by Gonzales-Crussi\textsuperscript{82} and Ackerman\textsuperscript{83} who cover many exotic phenomena but organise these according to the usual number.

The first scientifically respectable senses additional to the old five—using respectable in the sense that their existence is supported by experimental work in which the stimulus is defined and controlled, and by a successful search for relevant organs and physiological mechanisms—were senses associated with the bodily states of the perceiver, in particular with effort, orientation, and with motion and location of body parts. These senses have been known as the muscle sense, the sense of motion and the sense of balance but technical terms now denote them.\textsuperscript{84} It might be argued that these additional senses are not counted among the five for the simple reason that they provide internal bodily information, as opposed to intelligence of remote objects, but this division fails when one considers the logical dependence between what is remote in this context and embodiment, i.e. knowledge of the body.\textsuperscript{85} Further detail on this topic must be postponed until we come to our knowledge of spatial relations in general. If this is not thoroughly understood, then disputes over where the line between internal and external should be placed remain mired in naive or mistaken views on how sensory experience relates to space.

Additional good candidates for extra senses include the cutaneous temperature sense which is served by two types of organs, one for sensations of heat and the other for cold, and comparative work with animals has revealed further senses. Some animals apparently sense magnetic and electric fields, feats which humans manage only indirectly. There are also senses which we may have but are unaware of using. One example is the vomeronasal system for detecting pheromones which is important for some animals in identifying sexual partners, family members and other features of interest. Humans do have corresponding organs but how much we rely on them may be disputed. Yet another example is the so-called thermoscopic eye, an organ present in some snakes and so extraordinarily sensitive to changes in infrared radiation that it is much more useful than the snake’s eyes. Even the human pineal gland may

\textsuperscript{82}Gonzalez-Crussi (1990).
\textsuperscript{83}Ackerman (1992).
\textsuperscript{84}For the history see Wade (2003b).
\textsuperscript{85}Defining ‘external’ by the skin may be useful for some purposes. Brian Keeley chooses to define external for sensory processes by the boundaries of the nervous system and the associated end organs; Keeley (2002, pp. 11–12). A definition of ‘external’ along physiological lines will not be sought here.
be a sensory organ.\textsuperscript{86}

These examples may be multiplied, but there is a danger of simply adding more or less well understood faculties to a lengthening list, without addressing the role these senses play in human experience and how they are related to our most important “familiar modes of external attention”, as Gibson so perceptively styles the gross divisions in that experience.

Focussing on specific mechanisms and redrawing categorical boundaries, such as that between inner and outer, is facilitated by technical terminology which avoids or bypasses some of the natural associations in common language. These technical terms can therefore be helpful in indicating how the relevant sciences have moved on from what everybody would already seem to know about their own senses.

\textbf{2.2.2 The Technical Terminology}

A first step away from ordinary usage is perhaps to convert touches, tastes, etc. into tactile, gustatory, olfactory, auditory, and visual sensations for the old five. Adding more then becomes routine: thermal for heat and cold, kinetic for movement, vestibular for anything to do with the inner ear (apart from hearing), temporal, spatial, algic for pain, and so on. If any of these are still too familiar, one can always up the ante, as in the substitutions of haptic and cutaneous for tactile.

The next step is to turn away from sensations and start naming systems—or senses considered as faculties or functions. Among several possibilities, the most unpopular one now is one of the earliest: H. C. Bastian’s muscle sense,\textsuperscript{87} or \textit{kinesthesia}, which still harks back through the Greek to sensations, but names a system of nerves and motion and stress receptors. It is more common now to prefix ‘-ception’ in line with kinds of perception or information sources, getting proprioception for the perception of bodily state, for example.\textsuperscript{88}

The slippery slope to extravagantly large counts is resisted in various ways, depending on the scientific priorities, the general theoretical framework, and the underlying metaphysical commitments. Those concerned with bodily needs

\textsuperscript{86}Many of these topics are covered by Rivlin and Gravelle (1984). For a rather curious account of exotic aspects of the senses which nevertheless presents many valuable facts see Carr (1972).

\textsuperscript{87}For the development of the relevant concepts see Jones (1972).

\textsuperscript{88}Charles Sherrington first distinguished proprioception from interoception and exteroception. See Boring (1942).
may draw several lines of division. A common one is the skin, and we obtain words like interoception and exteroception, where the latter covers the traditional ‘outer’ senses as well as any stimulus from outside the organism. Sometimes a suggestion of a telegraph or transducer model of stimulus perception is slipped into the term by the interpolation of a ‘-re-’ so that exteroception morphs into exteroreception.

Those that emphasise the interplay of intero- and exteroception in any perceptual skill are likely to neglect this division and substitute what is being perceived for the simple inside–outside divide. This yields thermoception for warmth, nociception for pain, equilibrioception as an awkward label for the sense of balance, mechanoreception or even tactition for touch and so on. Vision, at least, retains its readily intelligible name, but is now usually portrayed as a system involving a range of sensations, some subliminal, originating both from ‘outside’ where the seen objects are located and from inside where (at the minimum) the muscles serving the eyes do their work.89

The confusion that can result is evident in the inconclusive debate over the proper use of the terms ‘kinesthesia’ and ‘proprioception’. Gibson, for example, would wish to reserve the latter for voluntary movements and largely to avoid the former.90 Since vision involves not just sensations of colour but also some kinesthetic and proprioceptive sensations, the complications arising from sorting out what contributes and how it does so can be avoided by talking more generally about sensorimotor skills. The helpfully vague ‘modality’ can also be attached to the relevant skill set and one obtains sense modalities. This is a quick way to acknowledge that, for example, seeing is much more than detecting photons impinging on the retina while retaining—more or less—the traditional senses.

It is not entirely clear what calling, say, vision or hearing a modality is intended to imply. Retaining some traditional senses as modalities is possibly desirable since sounds, colours, various smells, tastes and flavours, and various touches are so phenomenally different that it is hard to argue against them as distinct. There is also no need to dispute time-honoured ways of sharing our experience, as long as the relevant distinctions are commonly understood and the words retain currency. However, as already noted in the discussion of classifying sensations, the question is not how to play in the shallow end

89 Berkeley was well aware of some of these sensations and used them in arguments in his Essay Towards a New Theory of Vision. See Berkeley (1975).
90 See Gibson (1968, ch. 2 & p. 111).
of the pool but how to reach a better understanding of the old five while not ignoring what does not fit. It is here that philosophical, metaphysical and methodological commitments divide the field.

2.2.3 Avoiding the Issue

If one is not interested in the minutiae of neurophysiology, psychophysics, cognitive psychology and other special disciplines which more often than not advise counts other than the traditional five, there are some easy ways to avoid complicating already difficult philosophical considerations: 1) stick (mostly) to the traditional five, 2) single one out and (mostly) ignore the rest, or 3) take two and compare them or play one off against the other.

Reid organised his inquiry around the traditional five senses, but his strategy was actually the third option, and there is evidence in both the Inquiry and in later work that his approach was exploratory rather than conservative. The strategy of comparing senses usually becomes a contest for primacy and excellence between vision and touch. Reid shares it with Berkeley who advocated a kind of primacy of touch in his New Theory of Vision, but it is as old as the dispute between Aristotle and the followers of Democritus, with Aristotle accusing his opponents of proceeding “quite irrationally, for they represent all objects of sense as objects of touch”.92

Sticking to five, or opposing touch and vision, are not the most popular options. This honour belongs to the second option and we will find in part III when discussing vision how seeing is used as the one sense typifying perception. It fulfilled this role already in the Bible and still dominates the philosophical discussion. The crucial consequence of this is that disagreements become more difficult to unravel, since the stubborn complexity of seeing tends to mask, rather than display, diverging assumptions. These assumptions are then adhered to, while ostensibly unprejudiced efforts to understand the senses are pursued and, worse still, since so many are talking only about seeing, the limits of perceptual models which are quite natural for vision are neither properly tested nor disputed, but applied quite uncritically to all perception instead. However, vision with its peculiar illusions, its habits, and its daring leaps of the imagination has little in common with a sense like smell or a sense like

91 See especially Armstrong (1960) on this topic.
92 Barnes (1984, p. 702, Sense and Sensibilia). Aristotle’s problem is with the account of seeing which theorises it as a process of atoms, in the guise of eidola, impinging on the eyes and reflecting off, thus generating what is seen.
active touching. Our most cherished mode of attention, what we call seeing, is in many ways not at all typical of the senses. Moreover, it must not be taken for granted that we, who seem to see effortlessly, have any clear idea about how we accomplish this amazing feat.\textsuperscript{93}

The three ways to skirt the counting problem which have been mentioned can hardly count as good ways to avoid unwelcome distractions while thinking about perception in general. Since they are really tacit admissions that the full problem is being at least temporarily ignored, we should not expect that explicit argument explaining why investigations of seeing (or touching) will generalise to all perceiving will be offered, or why the traditional taxonomy is adequate despite the progress in various sciences advising that it is not. The usual procedure is to instead talk about perceiving while noting—incidentally or in passing—that only seeing is meant, or to mention other senses only when that reinforces the points being made and does not introduce complications into the model of seeing (or touching) that is being discussed.

These statements will be justified in part III which is concerned with vision, but they can already be illustrated briefly. A good example of substituting seeing for every sense can be found in Frank Jackson’s \textit{Perception}. Starting with four basic theses to underpin his version of Lockean representationalism in the introduction, Jackson immediately adds:

\begin{quote}
(The restriction to visual perception—seeing—is to be understood throughout.)\textsuperscript{94}
\end{quote}

The title of the book evidently promises more than the content delivers, but Jackson is certainly not alone in using ‘see’ and ‘perceive’ as synonyms.\textsuperscript{95}

A good example of the setting up of a competition between vision and touch can be found in Noë’s \textit{Action in Perception}, where the insights of Gibson, Merleau-Ponty, Berkeley and others are used with the latest research on sensorimotor skills to develop an enactive theory of perception. Noë restricts himself, again, mainly to vision. Touching as a manifestly active sense is used as a foil for looking and seeing, but while this widens the scope of the discussion this sense is treated as if it itself did not require clarification, hearing is hardly

\textsuperscript{93}On how little of what is accomplished in skilled activity can be articulated explicitly, see the considerations of Sennett (2008). Polanyi also offers many valuable insights in this connection, see Polanyi (1969a, part 3).

\textsuperscript{94}Jackson (1977, p. 1), parentheses in original.

\textsuperscript{95}Additional examples are given when vision is discussed in chapter 6.
2.3. SUMMARY

mentioned and the other senses are absent except for incidental mention. A dominance of vision is apparently unremarkable:

When we try to understand the nature of sensory perception, we tend to think in terms of vision, and when we think of vision, we tend to suppose that the eye is like a camera and that vision is a quasi-photographic process.\textsuperscript{96}

The tendency to opt for the camera model of seeing is certainly challenged by Noë, but the first tendency of substituting vision for perception or even playing touch off against vision in Berkeleian fashion is not.

How the counting problem is avoided by using the first strategy of retaining the five is shown in the next chapter as a prelude to reviewing the current debate on how the senses should be counted. Among those who do not ignore the counting problem there seem to be two chief concerns. The first is how one might retain or justify the traditional taxonomy in the face of challenges from scientific sources. If these efforts succeed then those that adopt the first of our three strategies may have, after all, missed nothing important. The second concern is with the taxonomic issue itself and takes the form of an examination of the four criteria for counting, efforts to resolve conflicts between them, and the search for additional criteria. As we will see, at the heart of this debate is a continuing quest to resolve the basic conflict between using sensation and stimulus, which arises in attempts to treat them or even to discuss them separately.

\subsection*{2.3 Summary}

Simple everyday accomplishments indicate that we use information which does not come from one of the five senses. In asking how this insight should be reconciled with accounts of perception where these five serve as the sources of all our experience of the physical world, the first step has been to examine the tradition and some of the different ways of counting senses which have arisen historically.

Although the doctrine of the five senses is sometimes ascribed to Aristotle, the count of five is actually an almost universal naive position, which follows from the prominence of the four head senses and the importance of bodily

\textsuperscript{96}Noë (2004, p. 35).
contact. Learned traditions depart from the naive count and teachings based on Aristotle offer nine or ten perceptual faculties or organs. Another tradition derived from biblical sources counts seven.

The importance of this variety comes from the differences in the underlying concept of a sense. While the modern understanding is that a sense is a channel whereby information is conveyed to the perceiver, the older conception was based on a reciprocal exchange or influence. An echo of this is still evident in considering both speaking and listening as a single language sense or faculty, as well as in paying attention to the differences between being touched and actively exploring something by touch.

The modern problem of counting the senses is therefore not continuous with earlier concerns and recent efforts to recount the senses need to be examined in order to see why there is a problem and what this is. Counting the senses is a taxonomic issue and specific criteria are now used to decide what is, or is not, a sense and how many there are. There are four general criteria: sensation, organ, stimulus and behaviour. Examined in turn it is shown that an emphasis on each leads to problems in counting.

The problem with using sensations is that our introspective knowledge of sensations, feelings and bodily states is imperfect, so that reports of the response to a controlled stimulus become subjective and a count cannot be completed. The problem with using organs is that there is a great deal of differentiation in the body, resulting in very large but indefinite counts of the senses.

The problems with using stimulus are several, but variously arise from the reductionist tendency in the physical sciences—which can more positively be glossed as a striving to unify theory—advising one or a very few senses. Striving for theoretical reduction eliminates sensations in favour of descriptions in terms of mechanical and mathematical models, but these descriptions are then hard to relate to experienced differences, such as that between seeing light and feeling heat. The theoretical pluralism of modern science also complicates matters. This is best illustrated by taking a historical view, and showing, as an example, how hardness has lost its status as a primary quality with the advance of science into increasingly abstract models. The methods of psychophysics which attempt to relate stimulus to experience by quantifying sensations only reintroduce the problem of sensations.

The problems with using behaviour are twofold. Not only is study of behaviour indirect in determining what the individual may or may not perceive,
it shares with the theoretical descriptions of the stimulus a reliance on theory, in this case biological and psychological hypotheses concerning the purpose of behaviour. A strong reductionism, which explains everything by the imperatives of survival and reproduction, has little to say specifically about the differentiation of senses. A more nuanced approach, such as Gibson’s ecological psychology, threatens to reintroduce a large number of perceptual channels and the problem of relating these to traditional counts remains.

Attempting to unify these criteria in a single account runs up against a tension when the possibly large counts, resulting from using behaviour, organs and sensations, are played off against theoretical descriptions of the physical stimulus. Emphasising stimulus advises not only smaller numbers, but divisions that cut across the compelling qualitative divisions between commonly accepted senses.

Returning to Aristotle’s treatment, it becomes clear that this tension arises in distinguishing the physical stimulus from the subjective response. This distinction should not be read back into Aristotle’s transactional account of perceiving.

Listing some examples of additional senses proposed in scientific research reveals that many, but not all of them, provide information on bodily state. However, the simple option of counting the traditional five as ‘external’, and the body senses as an additional but separate set, ignores the interdependencies which will have to be examined critically in connection with individuation.

The simplest philosophical response to the counting problem is to ignore it, perhaps by restricting attention to one or two of the traditional senses. Examples of substituting ‘seeing’ for ‘perceiving’ are easily found. The more general tactic of retaining the naive count is looked at next, before modern attempts to resolve the counting problem by analysing relevant criteria are reviewed, and a different solution suggested.
Chapter 3

Criteria and Complications

When some of the criteria for counting discussed in the last chapter are privileged, there is a tendency to arrive at very long lists of senses and this was presented as a failure of taxonomy. It need not be. Given a rule for classification, there is no reason to think that the rule is flawed if a long list of members is produced. It would be peculiar to claim that the old way of classifying something like elements is better than ours because there were only four, whereas we have now counted more than a hundred from a possibly larger set.

The counting problem was raised, however, not in order to motivate an effort to arrive at a better count, but to point out that there is a conflict incipient in a set of criteria which seem to be natural and readily agreed upon. It is not worthwhile stressing the fact that identifying, and then perhaps naming, thousands of olfactory receptors as individual senses is inconvenient, and that there are practical reasons for keeping numbers manageable. This kind of problem is easily addressed by devising a multilayered taxonomy. While that may involve considerable work, as can be seen, for example, from the fact that having a list of organs in hand is neither enough to make a start on naming systems, nor even necessary to make progress in analysing experience, that it is being done is evident in some of the new terminology of sense modalities or perceptual systems.

Challenges in putting together the four criteria, no less evident in how sensations are to be correlated with organs or behaviours than in the counting problem, are of interest at this point chiefly in that they remind us that any classification is based on theoretical commitments. It is these commitments which we wish to examine, and the counting problem serves mainly as a starting point which can lead us to those specific theoretical assumptions which
affect progress in understanding what our senses are and how we use them. Treating the senses as separate faculties, or at least individuating them for the purpose of counting, belongs among these theoretical assumptions, and much depends on what is taken to be truly separable, and what is distinguished merely for the purpose of analysis and theoretical modelling.

The notion that our senses function independently will be challenged in part II, but before this it is important to review the various approaches to the counting problem. Two broad, intertwined streams of thought can be identified. The first is a tendency to resist disruptions to the tradition of five, perhaps by trying to recover the common count through suggestions that what we mean by ‘sense’ is something different to what the scientists mean when they discuss the newly discovered senses. The second tendency is to examine the four criteria and either try to modify them, or find additional criteria which would recover the traditional count or at least a manageable number. As mentioned at the end of the last chapter, there are also various strategies to avoid the counting problem altogether. One of these is to simply ignore it and discuss the senses as if the recent progress in science had never happened. Because this strategy is quite common, examples of using it will be given first.

3.1 Seeing, Hearing, Touching, etc.

Gauging what is important about sensing can be approached by asking what every child is told as they are socialised into our culture. For the most part, children are taught very early to think that they have five senses. An impressive library could be assembled from all the helpful little children’s books which list them.

As we saw in the last chapter, expert opinion demurs, and modern textbooks for the professions and the sciences are not based on a list of five.\(^1\) This creates a curious tension. The five seem to be intended for public consumption, when a debate is to be avoided or when prejudices need to be kept unchallenged, when, in other words, the senses need mentioning but contentious issues or areas of uncertainty are better swept under the carpet.

To take just one example, in his book on the history of the senses “from antiquity to cyberspace”, Jütte\(^2\) manages to fit almost everything into the framework of five. While it is impossible not to mention the new senses of

\(^1\)One authoritative example is Guyton and Hall (2000).
\(^2\)Jütte (2005).
science, the treatment accorded them is slight and the third part of the book, “The ‘Rediscovery’ of the Senses in the Twentieth Century”, comes in six topics, the old five plus one for Psi phenomena. Although such examples could be multiplied, the issue is not important enough to treat in detail; this kind of simplification is common in material intended for a popular readership and someone who prioritises information over entertainment can always go to more specialised sources. Yet it remains true that the great revolution in our knowledge of the senses which has taken place in the last two centuries remains an eerily quiet one.

The important issue is how this plays out in philosophy. Robert Audi’s *Epistemology* is a useful example here because sensory experience is actually given some prominence as a source of beliefs and their justification right at the start, and Audi is typical. The basic strategy (it is tempting to call it the ‘et cetera enumeration’) is here: “visual, auditory, and so forth”. Here is an example from Keith Lehrer: “tactile, visual, auditory, and so forth”. Moving away from theory of knowledge to perception, this is what H. H. Price offers in the context of grounding his treatment of perception in a sense-data theory: “when I am in the situations called ‘touching something’, ‘hearing it’, ‘smelling it’, etc.”. In the context of a computational model of the mind, Jerry Fodor offers this variant: “perception (vision, audition, or whatever)”. And this is how David Armstrong approaches it while presenting his theory of mind:

It is tempting to include a reference to the sense-organs: the eyes, ears, nose, etc., in the logical analysis of perception. That is to say, it is tempting to say that seeing is the acquiring of true or false

\[\text{\footnotesize Audi (1998).}\]
\[\text{\footnotesize Audi (1998, p. 14).}\]
\[\text{\footnotesize Lehrer (1974, p. 91). This is in the context of clarifying what ‘sensations’ are and a few pages later we have “two sensations, those of pain and itching”, Lehrer (1974, p. 95), but no sense to go with them. The reasons for such telegraphic treatment are not mysterious. As Lehrer explains, the relevant “use of the term ‘sensation’ has been thought to be pernicious, but the reasons for such misgivings are not germane to our discussion”; Lehrer (1974, p. 91). The source of misgivings is not specified and while Merleau-Ponty’s first chapter in the *Phenomenology* might serve as one, the problems urged there, and closely related to my concerns, are routinely considered to be irrelevant to epistemology.}\]
\[\text{\footnotesize Price (1932, p. 3). Price’s stated aim is, by the way, “to examine those experiences in the way of seeing and touching upon which our beliefs concerning material things are based, and to inquire in what way and to what extent they justify these beliefs. Other modes of sense-experience, e.g. hearing and smelling, will be dealt with only incidentally. For it is plain that they are only auxiliary”; Price (1932, p. 2).}\]
\[\text{\footnotesize Fodor (1983, p. 44).}\]
beliefs as the causal result of the operation of the eyes, hearing is the acquiring of true or false beliefs as the causal result of the operation of the ears, and so on.\(^8\)

If a \textit{number} is required this is what Audi offers when discussing “some remaining problems about perception. […] There are two further kinds of problems we should explore. One kind concerns observation, the other the relation of perception to the five senses”.\(^9\) How the second kind of problem can be addressed without even considering whether it is true that we have five senses—in the face of evidence to the contrary—is unclear, and this difficulty is sidestepped by discussing seeing exclusively.

Occasionally a better list is offered. Roderick Chisholm is more generous than Audi with some variations in his examples, but the most complete list sitting under the umbrella term ‘perceives’ (construed as “\(x\) appears in some way to \(S\)” where \(x\) is an object producing some stimulus energy and \(S\) is the relevant subject) goes like this: sees, hears, smells, tastes, touches and feels.\(^{10}\)

Perhaps the \textit{et cetera} enumeration occurs only when the senses are a peripheral issue—if indeed it could be claimed that the senses are peripheral to theories of knowledge or of perception, or the philosophy of mind. Here, then, is an example from a study of \textit{sensory qualities}. While discussing Galileo’s views on the reality of primary qualities, Austen Clark explains that “all other qualities revealed in sense perception—colours, tastes, odours, sounds, and so on—exist solely in the sensitive body”.\(^{11}\)

It would be unfair to accuse Clark of sweeping anything ‘under the carpet’ in his pursuit of psychophysics so that it can address some of the worries of the defenders of subjectivity, such as Frank Jackson\(^{12}\) and Thomas Nagel,\(^{13}\) and eventually fulfil Fechner’s dream of an ‘objective phenomenology’.\(^{14}\) It must

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8Armstrong (1968, p. 211).
10Chisholm (1957, p. 149). What is meant by ‘feels’ is that the subject is aware of a certain part of the body, i.e. “that he senses in some way as a result of kinesthetic stimulation in that part of his body”. This is an extremely inclusive use of ‘kinesthetic’.
11Clark (1993, p. 6). The primary qualities listed are size, shape, number and motion. These are evidently not sensory qualities belonging to individual senses from the list of five. Aristotle’s list of common sensibles has five members and includes rest, although only four are mentioned in \textit{Sense and Sensibilia}. See Barnes (1984, p. 665, \textit{On the Soul}) and cf. Barnes (1984, p. 694, \textit{Sense and Sensibilia}).
12Jackson (1977).
13Nagel (1986).
nevertheless be said that the qualities Clark actually treats are still the few socially prominent iconic cases which served as starting points even before the sensationalists tried to make more complete lists.

Taking one last example, Whitehead, in his *Symbolism*, is quite happy to use an *et cetera* enumeration as in “qualities, such as colours, sounds, tastes, etc.”, but then one finds “those abstractions usually called sense-data:—for example, colours, sounds, tastes, touches, and bodily feelings”.\(^\text{15}\) The list is explicitly incomplete but so close to exhaustive that one wonders why odours are left out. ‘Bodily feelings’ is an expression vague enough to cover hunger, pains and itches, even emotions on some accounts, so it might seem that nothing but smells are left. Whitehead’s list is suggestive and the mention of bodily feelings offers one way to overcome the limitations of the tradition of five. The new senses are, as already mentioned, primarily messengers of bodily states.

We can now turn to examples of efforts to keep bodily sensations separate in order to keep the old list and then to efforts to acknowledge the role of the body yet still maintain the traditional count.

### 3.2 Retaining the Five

Recognising the counting problem and the new senses is a better alternative to quietly ignoring them, but this is not the same as abandoning the tradition. Sometimes the new research is explicitly acknowledged and reasons why it does not matter, or at least why it need not undermine the tradition, are given. Different motivations should be distinguished among efforts to keep the count of five, with one being a quest to keep a convenient number of sensory systems and another to keep a robust division at the subject’s skin. Alternately, it may be asked why we count five and to seek valid reasons, i.e. to seek an explanation other than our naivety, or ignorance, or failure to pay enough attention to how we use our senses. Since this latter reasoning is superficially the form of a range of arguments in the current debate on the individuation of the senses, some of these arguments need to be examined next.

\(^{15}\text{Whitehead (1959, pp. 21 & 25).}\)
3.2.1 What We Say

Judging by its reception, an article by Grice can be taken as the starting point for the current debate.\textsuperscript{16} As a prelude to discussing criteria for counting senses, Grice asks us to

consider the assaults made by physiologists and psychologists on the so-called ‘sense of touch’. They wish, I think on neurological grounds, to distinguish three senses: a pressure-sense, a warm-and-cold sense, and a pain-sense. Would we be happy to accept their pain-sense as a sense in the way in which sight or smell is a sense? I think not.\textsuperscript{17}

What ‘we’ should do is then briefly justified by word usage, pointing out the difference between the possibility of a smell being in the kitchen but the awkwardness of saying that there is a pain in the kitchen. Grice neglects to mention that we are happy to say that the kitchen is warm, so on that criterion there is no reason to reject a sense of warmth even if pains cause some problems, and that once we leave kitchens and start visiting less pleasant places we are inclined to call these places painful too.\textsuperscript{18} Of course, not much can be decided about all this without a proper semantic analysis, but one must presume that it is not impossible or meaningless for us to say that there is pain in the torture chamber or warmth in the parlour, so the argument dissolves into conservative fussing about word use.

Grice’s swift retreat from actually considering the range of senses, or what might count as such, into considerations of idiomatic word use and purely logical possibilities is then carried through by two strategies. The first of these is to bring in four-eyed Martians, and the second is to talk mainly about human vision. This is done in the interest of examining criteria for counting but before those are looked at, some even less promising arguments from what we say should be mentioned.

In his book on bodily sensations, David Armstrong explains that:

\textsuperscript{16}Grice (1962). This is reprinted in Butler (1962) and now in Macpherson (2010b) as the first of the classic papers. Keeley calls it “perhaps the twentieth century’s most cited discussion of Aristotle’s problem”, Keeley (2002, p. 20), although, as we have seen, this is a dubitable gifting of the counting problem to Aristotle and, as we shall see, Grice’s main argument has nothing at all to do with Aristotle.

\textsuperscript{17}Grice (1962, p. 134).

\textsuperscript{18}The fact that thumbscrews are painful is, however, mentioned as a kind of exception to the linguistic rule; Grice (1962, p. 134).
3.2. RETAINING THE FIVE

For all other forms of sense-perception besides seeing, hearing, tasting and smelling we employ the word ‘feeling’. No doubt this is the reason [...] why there is the doctrine of the five senses. We speak of only one further sense, because we have only one further word.\(^{19}\)

Since this is introductory to making a distinction between touch and bodily affections, it should perhaps be charitably ignored, but it is still amazing to be told that we had to stop counting senses because we ran out of words.

In general what we now say is irrelevant to the counting problem. To see this we only need to imagine that someone comes to convince us that we should count nine senses. It is clearly no answer to say: ‘oh no, we count five’. What we say, or have said, is no reason at all unless inertia is a good reason; justification only begins once we start explaining not what we say but why we say it. Further, whatever our actual reasons are, they still have to be proved against the reasons that our innovator brings to the table.

An exploration of why we count five senses is one of the contributions from Matthew Nudds to the debate on the counting problem. He suggests that “a sense modality is what might be called a social kind rather than a natural kind”\(^{20}\) and “what senses we distinguish is conventional”.\(^{21}\) These comments echo Gibson’s talk of “five familiar modes of external attention”, and there is undoubtedly a component of social cultivation in our discrimination and naming of sensations, or even objects.\(^{22}\)

It was pointed out above that we do not count five senses because Aristotle did, and it was even said that five is merely a naive first count. Should convention be substituted for naivety? It is easy to see that convention is the wrong place to look in explaining the number five. Wherever convention plays an appreciable role in human affairs, a rapid divergence between isolated communities is noticed since humans cannot seem to leave well enough alone and so re-interpret and modify traditions as they see fit. This is typified in the variety of languages, but is also evident in ritual, technology and other manners and habits. Yet Nudds claims that “the distinction we make between

\(^{19}\)Armstrong (1962, p. 9).
\(^{20}\)Nudds (2010a), emphasis original.
\(^{21}\)Nudds (2004, p. 50).
\(^{22}\)It is superfluous to go into great detail on this, since it is evident in the cultivation of taste in food and drink, the visual and other arts, and other pursuits where we express, develop and share our sensibility. Our ability to notice and attend is often also highly culture specific—good examples of this specificity can be found in Everett (2008) and in the psychological literature on perception in unfamiliar environments.
CHAPTER 3. CRITERIA AND COMPLICATIONS

five different senses is a universal one". 23 Something is amiss. It is true that there is considerable value in social conventions. As Nudds explains:

We can answer the counting question, however, without appealing to any natural distinction. It is a familiar point about the nature of conventions that if doing something the same way as others has utility for each member of a group of people then we can explain why all members of that group do something the same way as being a matter of convention. 24

But this only works for the proximal social group. If it was generally true then we would all be speaking English or whatever universal language eventually developed from the earliest signifying vocal gestures. Convention may have much to do with why we count seven or nine wits; it evidently has little to do with why we count four or five senses. To understand the lower counts at least some attention to ‘natural’ distinctions is needed, just as when faced with universal syntactical distinctions such as that between a verb and a noun, we need to appeal to general facts about how the human organism acts and thinks rather than the value of conventions. 25

With an emphasis on convention we are still basically confined to semantic considerations. The limited value of arguments about what we say is that the mostly trivial examples of common expressions amenable to detailed analysis do not clarify the problem at hand, and we have already seen that common usage is sufficiently tolerant of variable uses of the word ‘sense’ to unsettle any claim that the number five is final. 26 Unless, that is, one follows Grice and takes a censorious attitude to language. There are, however, other ways of exploring why we count as we mostly do count.

23 Or almost universal. See Nudds (2010a). We have already seen that this universality does not extend to scholarly traditions, but the existence of traditions not counting five does not affect the present argument since counting eyes, ears, etc. is well-nigh universal, as Nudds claims, and the additional senses discussed in the previous chapter are sophisticated developments of naive views, not just alternatives.


25 The enormous divergence in languages and other social conventions can be appreciated from the material in Everett (2008), whence it follows that to argue that some conventions are so valuable that they will become practically universal—counting by numbers might serve as an example—is wrong. It should also be uncontroversial that eyes and ears are not conventional, they are biological, i.e. natural organs, and to neglect this is a failure to notice the very distinction on which the argument rests.

26 That it is final seems to be the opinion of Nudds, and this is contested by Macpherson who notices a more tolerant attitude in the use of ‘sense’. See Macpherson (2010a).
3.2. RETAINING THE FIVE

3.2.2 What We Do

Instead of examining what people say or taking straw polls of how many senses acquaintances and friends are willing to countenance, John O’Dea seeks a robust psychological explanation for the prevalence of the count of five. His proposal is that when we sense in one of the five modalities, we know what we are doing. As O’Dea first characterises it:

*Given* that there are different sense organs involved, qualitative character really does make a difference to our intuitions about sense modality. I think there is a reason that our intuitions are sensitive to this combination in particular; that there is a specific aspect of our experience which captures the combination—what I will call, for want of a better name, the *feeling of using a sense organ*,\(^{27}\)

and then adds that “I might equally have used the term ‘awareness’ rather then [sic] ‘feeling’. Part of a perceptual experience is an *awareness* of the sense organ being used”\(^ {28}\). It is easy to agree that an awareness of using the eyes may often, or even routinely, be part of the experience of seeing something. However, what this means for counting the senses must be thought through carefully.

An awareness of the organ involved—be it inferential, as when we close our eyes, or more immediate, as when we are aware of muscular activity and strain in trying to focus on or locate a visible feature—is neither necessary nor sufficient to experience colours as such, and bringing in an awareness of what we are doing, with whatever part of the body is involved, surely cannot turn colours into sounds or sensations of warmth into the smell of roses.

Following O’Dea’s explanations through, it becomes apparent that what he has in mind has nothing to do with such magical transformations initiated by our awareness, and what he takes as truly relevant is the proprioceptive content of the experience. He adopts Gibson’s idiosyncratic definition of proprioception, which is not the usual awareness of bodily states (such as positions and movements of limbs) but the awareness of what *we are doing* with parts of our body.\(^ {29}\) This is usually spoken of as voluntary motion or effort and it is evidently closely linked to agency. Still, whatever technical term might apply, the substantive claim is that:

\(^{27}\)O’Dea (2010), emphasis original.
\(^{28}\)O’Dea (2010), emphasis original.
\(^{29}\)See page 64 above.
There are a number of reasons for thinking that perceptual experiences really do include an awareness of sense organ as part of their phenomenology, and that this grounds our intuitions about sense modality, which in turn explains why there are traditionally only five senses.\(^{30}\)

Unfortunately this is muddled. It is true that \textit{many} perceptual experiences have a rich phenomenology but the use of ‘sense organ’ is too loose here. Apart from drawing on Gibson’s ideas, O’Dea also credits Armstrong with characterising a sense organ as “a portion of the body which we [. . .] move at will with the object of perceiving what is going on in [. . .] our environment”.\(^{31}\)

This characterisation, taken perhaps as a definition, is faulty.

The chief mistake is mixing up sense organs with how we happen to, mainly, \textit{orient them} in order to perceive the objects of our interest. Although the empirical evidence affirms loudly, as Noë explains at length,\(^{32}\) that sensorimotor skills are vital in the acquisition of many kinds of perceptions, it is essential to be clear that this is often a working together of sensory and motor systems which are separable and join up primarily in the pursuit of specific objects. They need not do so; it is possible to see without moving anything. It all depends on what we mean by ‘seeing’. Colours are available without any of the movements normally needed to survey a scene and judge locations, sizes and distances of various features.\(^{33}\)

As soon as we move away from seeing and touching—those most troublesome modalities to start with—we can see that the claim that voluntary motion and our proprioceptive knowledge of which part of the body is being moved, or even used, has anything to do with individuating the five senses is nonsense. No one is aware of the organ ‘being moved’ when they hear something. Most of us have enough indirect knowledge of the importance of the ears and may swivel the head to hear a little better, but it can only be hoped that no one

\(^{30}\)O’Dea (2010).

\(^{31}\)Quoted with ellipsis in O’Dea (2010) and also noted without quotation in Keeley (2002, p. 13). Armstrong’s position as characterised by Keeley actually undermines O’Dea’s argument; details, quoting Armstrong, are given below.

\(^{32}\)Noë (2004).

\(^{33}\)By calling the traditional senses modes of attention, and then treating the orientation system separately, it is clear that Gibson was not confused on this point, but since Gibson was interested in affordances rather than sensations, he neglected to separate seeing colours from seeing textures, patterns and forms, hearing sounds from hearing warnings coming from a particular direction, etc. Cf. Gibson (1968).
would claim that the entire skull is the organ of hearing. Similarly, no one is aware of what, if anything, they are doing with the organ they use to smell with, even though the charming vagueness of ordinary language allows us to say that it is ‘the nose’. Smells are located in the head in a way that sounds are not, so we have a good idea which part of the body is involved. What we move is our diaphragm and what we feel is the flow of air, so in that sense we can have an awareness of the part of the body doing the sensing work, but none of this is needed to smell since sniffing and smelling are separable. A stench is offensive partly because there is so little that can be done to escape it. If we had to move something to perceive these things, then surely it would be easier to avoid them. Furthermore, one of the reasons why we have to be instructed to distinguish taste from smell is that we are not aware of the “portion of the body” used to detect the flavours of food.

The last point can be made stronger: we cannot become aware of the relevant organ, no matter how much we refine our gustatory discriminations of flavours and savours. An external intervention such as a head cold or holding one’s nose is needed. This results only in an indirect awareness of the organ, such as might be obtained from book knowledge.

The insistence on the necessity of our awareness of the organ being used reveals itself as misguided as soon as O’Dea tries explaining the “odd fact that some rather obvious senses were never included in the traditional five”. He first switches the definition of proprioception from Gibson’s self-aware exploratory activity to the explicit or implicit knowledge of the position of one’s limbs (thereby neglecting the movement of limbs—voluntary as well as passive—also traditionally included in proprioception), and then notes that whereas to look is to use your eyes, to propriocept isn’t to use anything; at least—and this is the crucial part—not consciously anyway. You are simply aware of the position of your limbs (indeed people tend not to be aware that they do know the position of their limbs other than through sight or touch; try asking).

But in moving we certainly are aware of the part of the body being used and being moved. So even if people tend not to be aware of knowing the positions

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34 The location of smells is actually not an easy issue to resolve introspectively, but then once we start attending closely, our grasp of where sounds originate is not simple either. On the subject of locality and sounds, see O’Callaghan (2010).
35 O’Dea (2010).
36 O’Dea (2010), emphasis original.
of their limbs, they are well aware of their movements and we should count a
sense of movement if not one of position among the traditional senses.

The perplexities here are easily resolved once we realise that the most
important naive distinction in perceiving is not between one sense and another,
or between what we do and what we suffer, but between (embodied) self and
(external) world. The reason why the sense of movement or the sense of balance
are not in the naive count of five can be understood by noting that these are
not ‘external’ senses. The naive count seems to be conservative by counting a
sense only when the range of what is perceived is not just sufficiently distinct,
but something which is ‘not me’ or, in a Berkeleian view of the perceiver as
passive patient, even ‘beyond my control’. If this is right, then knowledge of
the body is clearly not to be included, and even a very distinct set of feelings
and sensations, such as hot and cold, is not counted as a sense because it is not
very easy to untangle what belongs to the external object and what belongs to
the body. Hence the fact that ‘I’m hot’ and ‘it’s hot’ are practically, but not
quite, interchangeable on a hot day. This interchangeability fails for ‘it smells’
and an intransitive use of ‘I smell’; it also fails for ‘I speak’ and ‘I hear’, ‘I
touch’ and ‘I am touched’, and all those traditional wits which in earlier times
operated reciprocally.

Knowing which organ we are using has some role to play in the perception
of objects, but O’Dea’s proposal fails to explain what it attempts to, and leads
to absurdities. Taking up the suggestion from Armstrong, which to O’Dea
seems “a perfectly plausible characterisation of a sense organ in the ordinary
sense of the phrase”,37 we end up with the ridiculous notion that turning the
head means that we hear with the head. But trying to repair the suggestion,
by pointing out that the ears are difficult to move independently of the head,
merely deepens the muddle; getting free of it requires that we look at what
Armstrong actually said.

Here is Armstrong’s full text without O’Dea’s omissions: “a portion of our
body which we habitually move at will with the object of perceiving what
is going on in our body and environment”.38 Not only is this orthogonal to
O’Dea’s project since it counts, in the modern manner, both external and in-
ternal (bodily) senses, it is only the second of two criteria used by Armstrong in
asking what our concept of a sense is. This second activity criterion—actually
contributed by Anthony Kenny and merely entertained by Armstrong—only

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37 O’Dea (2010).
38 Armstrong (1968, p. 213).
supplements the first which is the “portion of our body which when stimulated produces a characteristic range of perceptions”.\textsuperscript{39} This is a classic statement of the ‘stimulus plus organ yields sensation’ view of sensing. Armstrong supposes that the two criteria may be individually necessary and jointly sufficient, but then notes problems with the necessity of the activity criterion, thereby casting doubt on O’Dea’s position more than 40 years before O’Dea proposed it, partly on Armstrong’s authority.\textsuperscript{40}

The approach taken to O’Dea’s proposal has so far been unrelentingly critical, but there is an important kernel of truth in saying that an awareness of what we contribute has an important role to play in individuating the senses. The only trouble is that it has little to do with the traditional count of five—what O’Dea is attempting to explain.

What we contribute should not be construed crudely as movement, or even voluntary movement, since gross movement is not necessary for awareness, or indeed needed to think and to imagine,\textsuperscript{41} which are both forms of activity and implicated in perception. More importantly, what we are aware of contributing to specific behaviours should not be confused with what we actually do contribute, or can become aware of or take ownership of as our contribution.\textsuperscript{42} Finally, it should be clear that moving and orienting our body with its organs is a means to an end, and when one wishes to use the senses to perceive external objects, the best thing to do is not to move but to keep still. ‘Stop and listen’ or ‘keep still and observe carefully’ are the instructions for obtaining intelligence of remote objects, and the attention has to be focused on these at the expense of heeding any proprioceptive feelings.

The main difficulty with the naive position is not that the separation of the traditional five senses is mysterious. It is, of course, based on the iconic sensations: colour, sound, odour, taste, and contact or pressure. Also, if the conservatism regarding a clear separation between ‘I and thou’ or ‘I and it’ is at least part of the story, it is not hard to see why the count is stopped at the skin with touch. Touch has always generated formidable problems for

\textsuperscript{39}Armstrong (1968, p. 212). This was already quoted on page 39.

\textsuperscript{40}Armstrong’s reasoning is not particularly relevant; what matters is that the naive count is not based on proprioceptive knowledge of our own activity.

\textsuperscript{41}It is, however, possible to argue that gross movements are necessary in learning certain habits used in thinking and imagining. On this see, for example, Noë (2004).

\textsuperscript{42}In an analogous context—that of manual skills acquisition—Sennet points out that even the most accomplished are largely incapable of explaining what they actually do in skilled performance. See Sennett (2008).
systematic thinkers, since even if it is easy to distinguish and communicate various sensations from the body or its surface, the depths are mysterious and vague, and the subject is difficult to separate from the perceived object.

It will be argued that the main problem with the naive position lies in a different direction: in the failure to notice that using sensations as a basis for individuating the senses is necessary but not sufficient for understanding what we accomplish when we perceive, or even what we ordinarily mean by perceptual verbs such as ‘see’, ‘hear’, etc.

At this point—given Armstrong’s criterion for what a sense is—it must still be asked why O’Dea struggles against the primacy of the iconic sensations, or what Aristotle called the proper objects of the special senses. This struggle with sensations is common in the literature and it must be dealt with at some length. A remark which Grice makes about pain can serve as the next step.

3.2.3 What Sensations Tell

In explaining why we count smell as a sense but not pain, Grice raises the idea that ‘painful’ is not a “relatively abiding characteristic which material things in general either possess or do not possess”, and goes on to say that “pains are not greatly variegated, except in intensity and location”, and that “almost any type of object can inflict pain upon us, often in more than one way”. In other words, pains tell us more about our own state than about the object.

These points are related to what was said above about feeling hot and a conservatism in the naive count based on separating the object of perception from the perceiver, but that suggestion of conservatism must be distinguished from, firstly, the idea that counting has anything to do with the simplicity or variegation of a range of sensations and, secondly, with the importance of the sensations for us.

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43 O’Dea admits as “unarguable that our actual basis for judging of ourselves that we are using one modality rather than another is experiential”, and notes that “the idea is extremely common in the literature”; O’Dea (2010), emphasis original. So sensations clearly have a role, yet he offers reasons why the usual strategy cannot work and pursues an alternative. For an example of relying primarily on sensations and experience, see Nelkin (1990).

44 Grice (1962, p. 134).


46 The phrase “relatively abiding characteristic” is also misleading since it has nothing to do with counting senses and little to do with sense experience. Although the colour of the teapot may be relatively abiding, the colours and smells and sounds of most of nature’s furniture are ephemeral, occasional and thoroughly contextual. Even so, it would seem that being hot, and painful to the touch, are abiding characteristics of glowing embers. They are at least as abiding as their colour and shape.
3.2. RETAINING THE FIVE

The idea that pains are not greatly variegated sounds like a remark from someone who has managed to avoid them. If pains truly have only one dimension of variation, which is intensity, and otherwise differ only in location, how is it that we differentiate between a headache, the sting from a bull ant or a brush against stinging nettle? The differences here are evidently not merely the location of the pain, its intensity and time dependence. But even if these explained the spectrum of pains, then that is already variation aplenty to talk about. There is an enormous spectrum of different pain experiences telling us a great deal about the object or circumstance causing the pain. Still, even if pain, or the sensations of warmth and cold, did each have only one dimension of variation, would this be any reason not to count them as separate senses?

Attempting to answer this without resorting to Armstrong’s shortage of words suggests the idea that what matters is the importance of the particular spectrum of sensations. In his contribution to the debate, Richard Gray contrasts how we separate taste and smell but not pressure and warmth.\textsuperscript{47} The idea is that it is to our advantage, biologically speaking, to count taste and smell as separate senses, but it is not perhaps as important for touching and feeling warm.

The trouble here is twofold. Firstly, pointing out that some behaviour is adaptive remains a platitude unless we uncover some evidence that the trait improves fitness without arguing in a circle. If we could determine, for example, that the Neanderthals died out because they neglected to find different words for odours and tastes then this would help, but the ethnographic evidence seems to go in the opposite direction, suggesting that humans can get by in all sorts of ways. Some, for example, have impoverished colour vocabularies and yet succeed in the business of communicating in very colour-rich environments.\textsuperscript{48} It is also a puzzling suggestion that separating \textit{senses} is either a boon or an impediment to getting across what we wish to say. We do, as a matter of fact, separate feelings of heat from feelings of pressure, and we do not have any shortage of words which prevents us from saying that something is hot, even if we don’t count a separate sense for these sensations. Ordinary predication is all that is needed.

But the more serious trouble with this line of reasoning is that the examples which Gray uses function much more effectively as counterexamples to his

\textsuperscript{47}Gray (2010).

\textsuperscript{48}Instructive examples are again to be found in Everett (2008). For a basic introduction to the vexed question of colour words and categories see Ings (2007, pp. 212–219). For much needed common sense on how naive linguistic assumptions have played into the debate see Lucy (1997).
claim. Long ago when humans first learned to use fire, it became imperative to warn infants off it, and feeling the radiant heat before touching the embers (analogous to smelling some food before tasting it) and communicating the anticipation separately from the injuring touch would, on the face of it, have high adaptive value indeed. Since avoiding burns is at least as important as avoiding foods which may be classified by smell to be rancid or poisonous—a task often accomplished by sight anyway—the separation of heat from pressure is a high priority. The basic mistake seems then to be tacitly assuming that when we don’t count a separate sense, the discriminations are either not important or may be difficult to communicate effectively. Both assumptions are plainly wrong.

3.3 Individuating Sense Modalities

After his remarks concerning word usage, Grice proposes four criteria whereby the senses could be distinguished. The first two criteria are two different ways of saying colours, sounds, smells, etc. by calling them first properties of objects (Grice uses ‘features’ of objects or events), and then experiences with “special introspectible character”, i.e. what we have been calling, along with tradition, sensations. Two other criteria based on differences in physical stimulus and sense organ complete the list of four, given here in a later and clearer formulation by C. A. J. Coady:

(I) The special features detected (or seemingly detected) by the operation of the senses.

(II) The “special introspectible character of the experiences” of the different senses.

(III) The external physical conditions upon which the senses depend.

(IV) The character of the putative sense organs and their modes of connection with the brain.

It is not difficult to notice the separation between a property of an object, such as its colour, and the subjective experience of that colour in this starting point, and what follows in Grice’s article is a bemused struggle with the first

\[49\text{Grice (1962, p. 135).}\
\[50\text{Coady (1974, p. 107).}\]
two criteria. The conclusion is that we cannot talk about the colour of objects without somehow involving our subjective experience of colour, that “the initial assumption of the independence of suggestions (I) and (II) has broken down”. 51

Why this should be considered a problem is not made explicit, and what possible sense could be made of saying that experienced colours are independent of the colours of objects is not explained, but considerations of Grice’s four criteria are prominent in the latest contributions to the debate on individuating the senses. 52 The counting problem is framed as if arguments over the suitability or applicability of specific criteria will eventually be decisive. Perhaps this approach is pursued in analogy with other areas where decisive criteria for, say, distinguishing different kinds of animals are based on how they reproduce. We have already seen that taken singly or as criteria for counting, the commonly recognised features of the senses—or what structures and processes belong to them—make unpromising candidates for taxonomic purposes. Not only that, taken together they generate conflicts.

There are thus two issues. The first is about choices among various ways of individuating senses, or deciding on priorities when multiple options are available. The second has to do with the concept of a sense and, since we have already seen that the counting problem does not have a simple solution when criteria which seem natural are used, it appears that the relevant concept of a sense may even be incoherent.

The two issues go together and our conclusion is that arguments over criteria are unhelpful. The fault must be sought in what is understood by an individual sense modality. A sense such as hearing or vision is, most importantly, not individual or separate from other senses, and although colours are easily distinguished from sounds, what are ordinarily called seeing and hearing are multisensory modalities. Although this is no longer controversial in a scientific context, the philosophical discussion vacillates between the naive or traditional conception of a sense—with its incomplete, perhaps indeterminate list of ‘common sensibles’ or even ‘primary qualities’—and the modern recognition of the complexity of what we usually call ‘individual’ senses. However, before examining the concept of a sense, the current discussion about the appropriate individuation criteria must be looked at.

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52 Notable contributions considered in what follows are from Coady (1974), Keeley (2002) and Ross (2008).
3.3.1 Considering the Criteria

Grice does not defend the choice of his four criteria. In relation to the historical debate they are peculiar in putting an emphasis on separating the properties of objects from subjective experience of these properties as well as from the physical stimulus, and leaving out behaviour. An object and its properties are normally subsumed under ‘stimulus’ and the usual distinctions for stimuli are between proximal and distal processes.\(^{53}\)

Grice’s criteria have been examined critically by C. A. J. Coady in perhaps the first important response. Coady casts doubt on the worth, or at least the decisiveness, of a criterion based on introspective character, and invokes appropriate behaviour as a way of checking. The traditional elements of the problem space are all present in Coady’s discussion of Grice’s four-eyed Martians who tell us, after teaching us their language, that their two sets of eyes which to us appear to serve the same purpose as ours, nevertheless supply them with two different kinds of experience, introspectively known experiences between which “there’s all the difference in the world!”\(^{54}\) A key unwelcome consequence of this assumed privacy of sensations known to us only through the Martian’s testimony is that:

Since we have no direct access to the nature of the sensory experiences of one another (for these are, on Grice’s showing, introspectible characteristics) then perhaps there are as many varied sensory experiences going on behind the outward unanimity of eyes, stimuli, color reports, and so on as there are people. Consequently, if it is possible that we are all having radically different sensory experience in connection with the exercise of outwardly similar organs, and so forth, then it is also possible that we do not have the same senses. And if this is so, then Grice’s investigation could hardly begin, since its starting point surely has to be one’s knowledge that Smith, Jones, Brown, and oneself all have the same senses and that, for instance, all share such a paradigm sense as vision.\(^{55}\)

Coady proposes that publicly accessible behaviour should be decisive, and that various ways of perceiving are

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\(^{53}\)Macpherson (2010a).


performances that we can request others to do. This active element in perception is very important and bears on the often neglected fact that perceiving is not a mere registering of psychological states but is something that involves the exercise of a certain range of abilities. For this reason I cannot see how we should ever accept anything as a kind of sensory experience if it were open to no voluntary control or supervision at all.\footnote{Coady (1974, p. 112), emphasis original.}

Although the Martians’ testimony does qualify as public performance, the problem with simply taking the Martians’ word for it on the differences of experience “is that the questions of identity and difference have been cut completely loose from their normal moorings in the public world”.\footnote{Coady (1974, p. 114).}

Everything now depends on where the emphasis is placed. Bringing in behaviour and pointing out that sensing is not an achievement separate from certain behaviours, just as enjoying non-hallucinatory colour experiences is not separate from occupying a suitably lit space, is a good step, but the path seems to lead almost inevitably to a rejection of sensations as an important criterion for individuating senses, in spite of the undeniable differences between the iconic sensory qualities. This rejection is attempted without examining what ‘private’ in this context can actually mean—the usual assumption is that it is absolutely private—and how we go about participating in a “public world”—as if the ‘public’ sphere was simply available for inspection and could itself be “cut completely loose from [its] normal moorings” in the privacy of the individual lived experience.\footnote{This is not an accusation that Coady is making this mistake, merely a characterisation of the ensuing debate which, as we shall see, fits. However, in discounting the Martians’ testimony as indirect and hinting that the Martians could even be mistaken en masse regarding their psychological states, Coady does suggest that the public should be privileged over the private.}

### 3.3.2 Discounting Sensations

In an important example of how sensations are treated, Keeley proposes that they can be safely ignored:

> For the purposes of the perceptual sciences, at least, distinguishing the senses from one another is not a matter of such folk-scientific
entities as the proper objects of sensation or some specific qualitative feel of conscious perceptual experience. Strictly speaking, this is not to say that qualia do not exist, but rather that they do not have a role to play in this particular scientific story, however useful they may be to our folk understanding of ourselves. Defenders of qualia need to look elsewhere for scientific legitimacy.\(^{59}\)

In line with this, Keeley rejects Grice’s criteria (I) and (II) after agreeing with Grice that these two are not independent and tracing the idea of a proper—or Grice’s special—object of each sense back to Aristotle and his “common-sense physics”.\(^{60}\) The four criteria Keeley adduces are physical stimulus, organ (calling this neurobiology), behaviour (based on the discriminations studied in psychophysics) and ‘dedication’ which is closely related to Gibson’s affordances; Keeley rejects the link by finding fault with the Gibsonian approach as too abstract and liable to multiple realisability, so that a blind person equipped with a sensory substitution system would have to be admitted to be sighted in a Gibsonian account, but in Keeley’s estimation remains blind even as they acquire information about light.

The concern in Keeley’s contribution is not with the range of senses which humans use either self-consciously or otherwise, or even with how the criteria he discusses might be used separately or together to count senses. Instead, Keeley’s main interest is a defence of materialism, and the advice on deciding what a sense is is methodological. It is to do what scientists do when they study the star-nosed mole.

It may well be true that when a problem is resisting a frontal attack, then it can be a good strategy to switch investigations from an area which has been worked over to somewhere else, even somewhere where the prospects for progress are dim and one has to make do with second-rate solutions. If we’re blinded by tradition then looking for exotic senses among moles and snakes or even Martians might be a good way to test our common sense intuitions.\(^{61}\) However, it needs to be asked exactly which problem is being solved here.

It’s not a lack of progress in the science of the human senses which would suggest that we go looking for moles. Recent progress in cognitive psychology is nothing short of spectacular, so motivation for deprecating sensations must

\(^{59}\)Keeley (2002, p. 27).

\(^{60}\)Keeley (2002, p. 20).

\(^{61}\)We’ll take a look at Reid’s exotically equipped race of beings, which he borrowed from Berkeley, in section 6.2.1.
be sought elsewhere. There is no mystery to this, since the recent philosophy of mind is preoccupied with the ontological and epistemic status of private subjective states. On one side, the defenders of subjectivity such as Thomas Nagel, Colin McGinn and Frank Jackson insist on the reality of qualia or the logical irreducibility of something that it ‘feels like’ to be sentient, while on the other, materialists at the extreme end of the spectrum “doubt their very existence.”  

Judging by Keeley’s criteria, letting go of sensations is not as easy as saying that “the distinct experiential qualities of perception—the qualia—so central to the common-sense understanding of perception are simply nonstarters for a scientific understanding.” Whatever value there is in ignoring sensations, it is clear that sensations re-enter the picture in Keeley’s third criterion: discrimination tested by behaviour. Keeley cites Clark admiringly in this context, and while the work presented by Clark is interesting, sensations are unavoidably its core and foundation. Psychophysics is nothing but the systematic investigation of correlations between sensations and stimuli, accessed via mean noticeable difference discriminations or, in the version relevant here, tracing out continuous paths through quality spaces on the basis of a failure to discriminate closely but not exactly matched stimuli. This is a modern, quantitative application of sensationalism. Mach was an important proponent of this general approach and the denial of the key role that experience of sensations plays is, at least historically, not part of its remit. Incidentally, the approach was used by Helmholtz and following him, Brentano decided that we have only three senses.

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62Keeley (2009, p. 71). Keeley opens his investigation into the history of qualia by remarking that “in philosophy of psychology and philosophy of mind these days, qualia are all the rage”.


64Clark (1993).

65See Mach (1959). Indeed, noticing the philosophical importance of Mach in the development of modern science should serve as a wake-up call to anyone tempted by psychophysics as a means of eliminating talk of sensations. Mach was perhaps the most ardent defender of phenomenalism that ever lived and he often asserted that only sensations truly exist. Blackmore’s philosophical biography of Mach is a useful resource and includes a comparison between Mach’s and Newton’s views on physical relativity; Blackmore (1972).

66Brentano (1979). The number of modalities will evidently depend on how one groups variations in the stimulus, not just the response, so various results are possible. Keeley espouses Clark’s psychophysics with two reservations. It seems to (1) produce “many more modalities than we might have otherwise thought”, and (2) “something more is needed than simply a capacity to discriminate behaviorally stimuli of a certain physical type”; Keeley (2002, p. 16).
But we have already seen the problem with this. Everything looks relatively robust with the iconic cases and Clark presents impressive graphs showing the multidimensional spaces of colour and sound variation. Still, we should not take the spatial metaphor too literally. A more detailed look at this field shows two things. Firstly, there is no direct access to ‘the’ colour space, we have only various systems useful for certain types of problems. Even a slight acquaintance with modern colour technology reveals multiple systems such as the RGB and CMYK spaces. Different countries have their own different colour standards! This is not bureaucratic overkill but testimony to the fact that “there is no generally valid direct relationship between spectral power entering our eyes, and thereby between reflectance functions of objects, and our experiences of color”. Kuehni, who presents an exhaustive treatment of the field and its history, finds it replete with “house of cards models”.

Yet colour is the easiest case! As Boring explains in his history, the real trouble comes once we start on the whole range of our sensations. Here it is good to remember that finding a continuous route from one sensation to another is no use in individuating the senses because sensations, like those of taste and smell, can be mixed. Psychophysics relies on preselected stimuli which have already been found to elicit relatively simple sensations. Without this preselection process, psychophysics is a non-starter and trying to get rid of sensations from the enterprise removes the foundations of any theoretical house of cards erected on top.

Setting aside programmatic intentions, there is really nothing in Keeley’s rejection of the ‘Aristotelian’ criteria. It does not even succeed in getting rid of the need to discuss sensations, since these come back to haunt the project in the admission of the results of psychophysics and even in the rejection of multiple realisability. Sensations are the ineliminable starting point for distinctions between the senses and supplementing this with talk about organs

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69 Kuehni (2003, p. 338). These comments should not be taken to imply that quantifying sensations is wasted effort. See Savage (1970) and Clark (1993) for insights into the development of modern psychophysics.
70 Boring (1942).
71 Even something as familiar as smell presents formidable problems. Clark says that “odour perception is the most obscure of human sensory modalities”; Clark (1993, p. 143). Unless one uses ‘sensory’ as a synonym for one of the five this is highly unlikely, but it is true that smelling (and tasting) are terribly complex. For some insight into the complexity of the physical mechanisms underlying smell, see Turin (2006).
3.3. INDIVIDUATING SENSE MODALITIES

or behaviour is at best secondary, useful where the human ‘royal road’ of expressing and sharing individual experience is lacking. This is implicit in the attack on Keeley’s eliminativism mounted by Peter Ross, who notes that psychophysics does “not merely study behavior, but rather uses behavioral evidence to study qualitatively characterized sensory responses to stimuli”.

Paradoxically, Ross then goes on to argue that sensations (he uses ‘qualia’) are not required to individuate the senses. This can be done by invoking “mental qualitative properties” instead, with the main advantage being that these properties “need not be conscious, but instead can be characterized in terms of a psychological quality space independently of consciousness. In this case, qualia aren’t needed to distinguish senses. As a result, there is no potential limit on scientific understanding of perceptual states”.

There are important pointers here for the way ahead. Firstly, it is very true that our awareness is complex, and insisting that sensations are necessarily conscious and exist only while ‘in the mind’ can lead to unnecessary trouble. There are good reasons to admit the existence of mental acts and properties which we are unaware of, and it was routine to do this in, for example, the medieval picture of the mind. Reid also suggested that there may be many sensations which we pass over unnoticed and advised an introspective search for them. Hence there is the possibility to learn about previously uncounted senses, not just in a speculative or inferential manner, but in a way that is transformative of our experience of life, by learning to finesse or pay attention to previously nebulous feelings and affections.

But this enthusiastic adoption of unconscious “mental qualitative properties”, which go nicely with the Peircean metaphor of awareness as a deep lake, are not quite in line with Ross’ intention which, apparently in common with Keeley, seems to be to rid science of the burden of having to deal with awareness—Ross uses ‘consciousness’, as did Peirce—at all, and hence

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73 Ross (2008, p. 313).
74 Ross (2008, p. 313).
75 We have noted that even colours were not present to awareness without the central sense in the Aristotelian framework. See also Hatfield and Epstein (1979). Unconscious sensations were also taken for granted by Mach, but it must be admitted that insistence on the existence of unconscious sensations not only sounds awkward, but generates problems for phenomenalism. See Blackmore (1972).
76 See, for example, Reid (2000, p. 56). There are numerous instances of Reid admitting the difficulty of attending to a “fugitive sensation” but asserting the necessity of doing so.
77 Peirce (1958a, 7.553–554).
help the scientists. It is hard to see why scientists need that kind of help or, given the empirical methods already in hand, exactly what limits “on scientific understanding of perceptual states” arise just because these are admitted to be states of awareness.\textsuperscript{78} To understand some of these worries we need to take a closer look at the perceptual relation, what is or is not irreducible in it, and how metaphysical assumptions convert the perfectly familiar wakefulness which we enjoy into an intractable problem, or even a limit for scientific understanding.

The common sense view that we enjoy sensations and that this enjoyment is the basis for classifying them and for acting on them—or to say it more precisely, that we perceive objects, situations and processes which have properties and characteristics that can be classified in ways that include naming sensations—still stands. It might be true that specific sensations are not necessary in any one episode of perceiving (which can be described \textit{post hoc} in any way that is appropriate, even by naming a particular performance with an oxymoron such as blindsight), but it does not follow that they are never necessary. Without an experiential basis, all that more sophisticated and rigorous science would never get started. How and why would we start investigating something which we have never had the faintest notion of? Even the most occult qualities and entities of modern physics can all be related to ordinary sensations in some way, and thereby at least partially revealed.

It can hardly be denied that since the dawn of the enterprise scientists have been devising intricate theory to save the phenomena—this holds no matter what one thinks about the status of the resulting theory. Both Keeley and Ross are now offering to help by dispensing with the phenomena, leaving nothing to save. It is this approach which suffers from a lack of scientific legitimacy, and defenders of such illogic need to look elsewhere for support.

If this is an unfair portrayal, and it is tempting to protest that at least Ross is advocating ‘qualitative properties’ styled as sensations which are only optionally conscious, it nevertheless remains true that the existence of these unconscious mental states is supposed on the basis of conscious experience and in analogy with certain factors identified in it. It is difficult to see how mental qualitative properties can be anything if they are not at least potentially

\textsuperscript{78}The quotation is from Ross (2008, p. 299), and he is referring to the notorious explanatory gap between the physical and the mental. The existence of this gap is related to certain conceptions of what constitutes a scientific explanation, and it does not always impress scientists as an acute problem. See, for example, Trevarthen and Reddy (2007).
experienced, and hence construed in analogy with those sensations which we all easily enjoy.

Thus far we have discovered the individuation debate to be concerned with specific criteria and their relative importance. Since the criteria are still in dispute, it is understandable that no clear answer to the counting problem has emerged. But perhaps the main lesson of psychophysics, the complexity of our sensations, shows the way forward. To see this, the concept of a sense must be re-examined and subjectivity, instead of being denigrated through complaints that this or that concept of a sensation is unhelpful, must be given its rightful place.

3.4 The Concept of a Sense

The difficulties which surface when attempts are made to count and individuate the senses according to specific criteria suggest that there is a lack of clarity in our concept of a sense. The proposals examined so far are largely efforts to supplement common sense notions about the senses with a more critical understanding of the part that behaviour plays in the perceptual process, and supplementing, or even supplanting, ordinary language use with scientific (theoretical) accounts of the physical world. Emphasis on behaviour includes pointing to the role that the individual perceiver plays—as with the public performance demanded by Coady—as well as considering how much the perceiver knows about their own activity—as with the proprioceptive feelings in O’Dea’s suggestion. Stressing the importance of behaviour would seem to go together with a de-emphasis of sensations, or what is now variously called introspective knowledge, private experience or knowledge of qualia. Examples of this have been given.

These critical and analytical efforts can be put into a broader context by going back to the simplest conception of what a sense is, and then asking what necessarily belongs to it, and how the complications evident in criterion-based counting have arisen. The simplest idea of a sense is that it is an organ of knowledge or perception, an organ which is adapted for a specific function, and in the case of perceiving this function is to inform the perceiver’s awareness.

So long as this idea remains grounded in traditions and habits, the role of functioning organs is secondary, and attention is centred on what is perceived rather than on how this is achieved. The epistemological stance, which asks what perception is and investigates its reliability, then questions the accepted
wisdom and threatens the usual regress: in explaining that perceiving is using a particular organ or set of organs in some manner, the question arises how this is known. If through perceptual processes such as O’Dea’s ‘knowing what we are using or doing’, then one is left with the problem of explaining these perceptual processes and gauging their reliability in turn. If through some other cognitive process, then (since our endowments do not appear to have a logical necessity) this ‘other’ cognitive process supplying our understanding of perception needs to itself be validated. In each case the source of our knowledge of perceiving is again subject to questioning, apparently without end.

In this predicament it is tempting to look for foundations. What purport to be such foundations are found as soon as we recall the importance of specifying the stimulus and the physical processes attending stimulation of the organs on the one hand, and the importance of the behaviour of the perceiving organism on the other. In both cases a language providing a description of the processes underlying perception seems to furnish the explanation.

A moment’s reflection shows that such foundations for understanding perception are themselves groundless. This is true because the theoretical language used in such explanations cannot be cut loose from its moorings in everyday perceptual experience. In the final analysis, behaviour is intelligibly structured movement and movement as such is known directly only through perceptual experience. The same goes for descriptions of physical processes, since physics also draws on perceptual experience to devise theoretical models and to formulate metaphors. The approach of seeking such foundations thus fails, unless they are adopted dogmatically, or one is content to use some aspects of perceptual experience in order to explain some other aspects. The latter may serve well in explaining some particular perceptual process or task, but it cannot, as a point of logic, serve as a foundation for an account of perception as such.

The problem of foundations is, however, quite illusory. The mistake which leads to it is the error of inverting the role of perceptual experience with the theories which are used to explain whatever is puzzling or mysterious in that experience. The correct ordering, reflected in the everyday epistemic routine of appealing to direct sense experience for decisive justification, as well as in all scientific procedure, is that perceptual experience—observation, experiment and comparison—is the final arbiter on the adequacy of a theory or explanation. There is no foundation for perceptual experience and nothing needed to underlie it or to ground it; the most that can be asked is that
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anything derived from that experience by means of inference and theoretical elaboration is consistent with it, so that expectations based on any derived theories are fulfilled.

Since epistemologists such as Audi hold as a central concern the issue of fallibility and the possibility of illusion, the grounding of all understanding in experience indicated here may naturally need to be taken in a global sense. Disputing then the redundancy of foundations which validate all experience then entails the further step of a suggestion that perhaps all experience is questionable. This is an inversion of the usual priority between trust and doubt. Reid discussed this in connection with the trust exhibited by children, and notes that Cartesian universal doubt cannot possibly be a good epistemic procedure.\(^{79}\) Peirce makes related points in his attack on Cartesian philosophy.\(^{80}\)

The motivation behind blanket pronouncements on the appearances needs to be looked at. Why would something be called illusory unless access to the veridical made it possible to compare the two? But what is access to the veridical if not just confirmation in more perceptual experience? The theories of science do not allow any privileged access to a transcendent realm of the veridical—they are built from and upon the foundations of experience and they are worthy of less, not more trust than the basis that they rest on. So the best we can hope for is to validate or dismiss any specific experiential episode by an appeal to another episode or set of experienced events.\(^{81}\)

Seeking a form of discourse and means of validation beyond or additional to the possibilities of direct experience, in so far as this is a goal in the emphasis on behaviour or on physical process, is already a deprecation of the primacy of experience. Hence it goes naturally with suggestions that sensations do not play any important role in perception, that they can perhaps be ignored as an idle accompaniment to processes which we investigate indirectly by the methods of the quantitative sciences, or even that there is no need to mention them at all.

There must be good reasons for these qualms about including sensations

\(^{79}\)Reid (2000, ch. VI, sect. XXIV).

\(^{80}\)Peirce (1958b).

\(^{81}\)This coherentism is consistent with some aspects of Peirce’s fallibilist epistemology in which a particular experience can only be validated by, or explained by, appeal to other experiences, or at least possible experiences, and theory serves as a useful tool of general expression rather than an account of what the world is ‘really like’. Validating one experience by another is not only legitimate but epistemically routine and “the reader will, I trust, be too well grounded in logic to mistake such mutual support for a vicious circle in reasoning”, Peirce (1958a, 6.315). See also Davis (1972, pp. 20–21).
or giving them a role to play in perception. What is it about sensations that makes dealing with them so problematic? One answer is offered in a recent historical study by Keeley, in which he argues that the very idea of a sensation is vague and confused.\textsuperscript{82} Now while this may to some extent be true, it is difficult to believe that we cannot make headway with aspects of experience—colours, sounds, feelings—which we have expressed and shared throughout millennia. If anyone is confused, then it is unlikely to be the ordinary perceiver looking at a red teapot and tasting the hot tea; it is surely the philosopher who complains that they do not have a clear idea of what a sensation is.

The basic problem with sensations is easy to see. As now understood they are (in Grice’s phrase) things with special introspectible character and, as Coady puts it in following through the logic of Grice’s problem, apparently neat experiences cut loose from any connections with the shared public world.\textsuperscript{83} Attempting to discuss such things is understandably difficult but the problem is entirely artificial. There is no question that sensations cannot ever play a role if they are cut loose and abandoned in a private, inaccessible place. But that is only a misguided way of speaking. The practical problem of sensations is not what they are, but how we deal with them in experience. As now usually characterised, they are subjective, private and objectively inscrutable. But there is ordinarily little need to talk about sensations, what they are and where they reside, apart from naming them to indicate aspects of experience.

Where a colour belongs would seem to be a sensible philosophical question, but it is unsettling that the arguments about the ontological status of sensations, and where they belong, are so difficult to settle. One way of overcoming this stumbling block lies in admitting that the colour belongs neither to the perceiver, nor the object. It belongs to the process of perception. To see how this can make sense we need to get beyond the primary and secondary qualities of early empiricism and note how the choice offered at the time was artificially restricted.

\textsuperscript{82}Keeley (2009). As already noted above, the word ‘sensation’ is used throughout interchangeably with more recent terms such as ‘quale’, which aim to be more specific or technical. It may be objected that this looseness blurs important distinctions, but since any term is only meaningful in its use, and this use meanders and grows as the word serves many individuals and their particular problems, trying to restrict usage is vain. Keeley credits Peirce with the modern introduction of ‘quale’, but Peirce’s meaning—serving to point to one of his categories—is not close to what modern defenders of subjectivity mean, and Peirce used ‘sensation’ or ‘quality’ far more often than ‘quale’. Hence which word is used is far less important than the purpose it serves, and that can only ever be clarified by context.  

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The best way to do this is to again take a step back to where the problem originated. The main protagonist is Locke whose oversimplification of his scientific mentor’s ideas on qualities generated the problem in the first place. Locke’s mentor was Robert Boyle. Seeking Boyle’s views is not merely a historical exercise because the modern debate on qualia is still a contest between those who deny any substantial role to subjectivity and seek to avoid any talk of sensations or qualia, and those who insist that there must be room made for subjectivity, that there is something crucial in what it is like to experience colours, sounds, odours, etc. Among the latter are Nagel, McGinn and Jackson, with Jackson at one time defending a very classical version of Lockean representationalism.\footnote{In Jackson (1977).} All of these philosophers seek to make room for subjectivity by separating the subjective from the objective, the public from the private, and McGinn and Jackson are particularly concerned to defend the primary–secondary distinction explicitly, despite problems such as the positivist drift discussed in the last chapter. Clark’s efforts to quantify sensations through the methods of psychophysics address the same set of worries.\footnote{Clark is explicit on this; see Clark (1993, ch. 1), particularly his comments on the primary–secondary distinction and the explanatory scope of physics.} The problems with Locke’s position are thus still live issues. Reid’s views are again highly relevant, since his attack on the phenomenalism of Hume and Berkeley hinges on the doctrine of qualities, and our direct knowledge of those that are primary to physical objects.

The strategy of making room for subjectivity by separating the private from the public or making analogous divisions—the separation of secondary qualities from primary qualities is used as exemplary in the next section—fails for the same reason that attempts to get rid of sensations by privileging a theoretical discourse—be it that of physics or of behaviourism—also fail. The division is groundless and it only serves unstated assumptions about the need to provide secure foundations for perceptual knowledge, and to anchor these foundations in a mythical realm outside sense experience. As a consequence, the following remarks on this particular way of defending subjective experience—by first admitting the division and then insisting that the subjective side cannot be dispensed with—are as critical as the above attack on the notion that there are privileged modes of discourse which can be used to deal with the purely objective processes underlying perception.
CHAPTER 3. CRITERIA AND COMPLICATIONS

3.4.1 Cosmical Qualities

As we have seen in section 2.1.3, Reid defended the separation of the qualities of objects into primary and secondary kinds. The distinction is crucial to his epistemological scheme but that is less important to us than something that Reid said about secondary qualities. Even as he defends it, Reid locates problems with this central distinction between the primary and secondary qualities of objects. His argument for the need for it echoes Locke. Starting with an admiration for science and its ‘eternal truths’, he admits that the processes underlying smell and other sensations bear no resemblance either to the properties of objects or their powers and dispositions. He then offers the Cartesian comfort that God has prearranged the correlations between our sensations and external reality, and He would not deceive us. To Reid this implies that we have no reason to be concerned that our sensations are not copies of the qualities of objects but only signs for them instead.

From this comes a suggestion that when we talk about smells and colours or when we say that something is hot, the quality terms are ambiguous, referring, as they must, to both our sensations and the relevant correlate (quality, property, process, power, disposition—as applicable) of the body in question. Ordinary people, when they say red, mean only the quality of a body, while philosophers tend to think of the sensation: “when philosophers affirm that colour is not in bodies, but in the mind; and the vulgar affirm, that colour is not in the mind, but is a quality of bodies; there is no difference between them about things, but only about the meaning of a word”.

This is unlikely. Reid is asking too much of the ordinary understanding by insisting that in using sensation terms the vulgar knowingly denote occult qualities known only by their effects. A sophisticated explanation of what the naive mean, such as this, is plainly wrong. The naive realist is deemed naive precisely because he is unsophisticated. Rather than understanding the distinction between a sensation and an occult, underlying reality, and using a verbal trick for the sake of brevity, he fails to see the distinction between

86 The toing and froing over the distinction is dealt with especially in ch. V, sect. VIII of the Inquiry, where Reid takes pains to distinguish “sensations, which have no existence but when they are felt”, from the causes of sensations, i.e. “the things suggested by them”, and accuses Aristotle of failing to notice the distinction since he “confounds these two”; Reid (2000, pp. 72–73). As we have seen, Reid is right about the absence of that distinction in Aristotle, but it is unreasonable to call this a failure unless it can be shown that Reid’s account of perceiving is better than Aristotle’s.

87 Reid (2000, p. 88).
appearance and reality in the first place, i.e. fails to notice the putative ambiguity.\textsuperscript{88}

Giving God all the credit for prearranging the order of the world and our constitution in such a way that there is a generally reliable correlation between our subjective states and the worldly states of affairs is a fairly good move on Reid’s part. It is certainly better than any assertion that we know which qualities and properties are primary because these are intrinsic to an object, or the suggestion that there are only two kinds of properties, and since the secondary properties are observer relative, the primaries must be those that are not.

Since the treatment offered by Colin McGinn displays the relevant mistakes very clearly, it is worth pausing to consider it.\textsuperscript{89} Firstly, secondary qualities are those that arise from powers or dispositions in an object which “produce sensory experiences in perceivers of a certain phenomenological character; whereas primary qualities are said not to consist in such dispositions”.\textsuperscript{90} Since lists generally offered are “not exhaustive”, and we have seen from the efforts to classify the senses that complete lists are elusive, it follows that we must recognise primary and secondary qualities either by a difference or, if other kinds are countenanced, independently.

It may well be asked how we would recognise any quality in the absence of experiences of “a certain phenomenological character”, and here Reid is inventive again since he gives us direct access to experiences of the required sort. Our apprehension of primary qualities is thus either not subjective, or both subjective and objective, because the only alternative would render them observer dependent, and so secondary. The Lockean tradition (in McGinn’s words) then claims that we “can recognise” which are which without offering explanations of the basis for this recognition. No need to search for that of course, because we have already found it in the eternal truths of the mechanistic philosophy and its descriptions of physical objects.

This ruse unfortunately fails in the contemporary theoretical landscape, so

\textsuperscript{88}This was one of Hume’s main criticisms of Reid’s\textsuperscript{88}\textsuperscript{ Inquiry. “The Author supposes, that the Vulgar do not believe the sensible Qualities of Heat, Smell, Sound, & probably Colour to be really in the Bodies, but only their Causes or something capable of producing them in the Mind. But this is imagining the Vulgar to be Philosophers & Corpuscularians from their Infancy. [...] And indeed Philosophy scarce ever advances a greater Paradox in the Eyes of the People, than when it affirms that Snow is neither cold not white: Fire hot nor red”; Reid (2000, Hume–Reid exchange, p. 256).

\textsuperscript{89}McGinn (1983).

\textsuperscript{90}McGinn (1983, p. 5).
a new way must be sought. Jackson offers to face the dilemma by sitting on both chairs, acknowledging first that “there is currently no such thing as the picture of ultimate reality associated with Modern Physics”, and then that his “argument for the conclusion that material things are not coloured derives from science in general rather than from Modern Physics in particular”. Even assuming that this disarming vagueness is intended, he still needs “the truth of certain scientific causal explanations, and, in particular, the truth of certain accounts of how the material things around us cause changes in our brains”. To the extent that this amounts to saying that Galileo was right about objects, there is little to object to in granting Ptolemy similar favours in connection with celestial orbits, but with the mention of brains it clearly does not stop there.

Pausing to worry about brains is unwarranted since a more direct way to the recognition of primary qualities is at hand. This lies in saying that they are intrinsic. As it is sometimes put picturesquely, a lone teapot in an otherwise empty universe would still have the shape of a teapot.

Taken as a revealed truth or a personal intuition the status of this is beyond challenge, and it may even be comforting as a metaphysical proposition about teapots, but in an epistemic context (especially one that takes the hypothetico-deductive approach seriously) one needs to worry about unfalsifiable truths and ask how exactly one determines the shape under those unusual circumstances. What McGinn says is helpfully revealing. After noticing that the relativity of colour perceptions has a parallel in our distinction between

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91 Jackson (1977, p. 121), emphasis original.
92 Jackson (1977, p. 121).
93 Jackson (1977, pp. 121–122).
94 Jackson makes many of the same points as McGinn, and makes them vigorously, so it would be tempting to argue with Jackson. This would inevitably lead to further digression. Fortunately, Jackson’s project is largely irrelevant, since his concern has nothing to do with the senses and everything to do with arguments about metaphysical systems. He is defending sense-datum theory and representationalism against idealism, he takes the hypothetico-deductive method as a given without presenting any empirical evidence to either confirm or falsify his own theoretical views, and indeed is unconcerned with any investigation of epistemic strategies and the use of the senses. There is nothing to object to in efforts to prove that some theory or other is self-consistent or immune to certain purely theoretical dismissals, or even advocating its metaphysical appeal and elegance, but our present concerns lie only with the usefulness of the theory in either pursuing and culturing sense experience, or in analysing that experience, to discover what is irreducible in it. So Jackson’s main arguments can be put to one side. Admittedly, similar remarks could be made regarding McGinn’s project, but at least in the work presently at hand the status of qualities is the main concern.
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real and apparent shape and size, he asserts that for the primary qualities “there is an experience-independent criterion for whether the primary quality is instantiated, viz. measurement; but for secondary qualities the distinction is drawn from within the realm of appearance, by reference to experiences taken as standard”.\footnote{McGinn (1983, p. 11), emphasis original.} It is difficult to know what to make of the claim that measurement is in any sense “experience-independent”. Experimentalists would know that measurement without experience is an oxymoron, and that while good measurements are sometimes hard to perform (requiring not just experience but ingenuity and skill) there is no reason why secondary qualities cannot be measured using the same methods as those labelled primary are. If anything stands in the way of measuring sensations it is not whether they are associated with colours or shapes, but their complexity and dependence on context.\footnote{For modern approaches to measuring sensations, see Clark (1993) and especially Savage (1970). In this context it is also worth thinking about whether mass, magnetic flux or electric charge are to be taken as primaries, and how they—or anything at all—might be measured without relating them to “experiences taken as standard”.
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The foregoing is simply an assertion that measurement involves comparison and any measured quality or property is relative (and not inherent) in at least that sense. The standard reply is that comparisons are required only when one is seeking numbers, and in the context of our lone teapot “it is clear that there might be such an isolated object, and that it would have to have some length: an object couldn’t fail to have any length whatever. Thus, having length \textit{simpliciter} is not a relation, though having a certain length in a certain unit is”.\footnote{Jackson (1977, p. 135), emphasis original. My own intuitions tell me that having a length is a relation between one end of the teapot and the other, and something which cannot be thus partitioned (at least notionally) is dimensionless and lengthless. When words such as ‘intrinsic’ are used it is essential to ask ‘intrinsic to what’? The same applies to what are called ‘internal relations’ and even ‘absolute’ and ‘relative’. Cf. Blackmore (1972, pp. 90–95) for instructive remarks on the complexity of these terms in Newton’s thinking.}

It is comforting to find that this is clear to Jackson, but such imagined certainties surely rely on metaphysical intuitions about space and emptiness, and what it means to be physically present. We will look at this in more detail when considering Reid’s ideas about our apprehension of extension and form. For now, it only remains to be noted that this particular intuition relies on some version of the common notion of space as room to move, as an absolute empty nothing extending effortlessly in all directions. Such views are undoubtedly attractive to some but, needless to say, disputed in science with the relevant arguments by no means settled. Choosing a contentious thesis to
serve as an axiom is risky procedure in building a philosophical position, and it certainly is best not to seek support for it in Modern Physics.

This digression on primary qualities is slightly off-track since the goal is to consult Reid on secondary qualities. It was required in order to mention some naive—perhaps more charitably described as common sense—intuitions about lonely teapots, the ineffective nothingness of empty space, and the abstract truths about the shapes of triangles which can seem forceful and unquestionable when we do not investigate either how these intuitions occur to us, or how we can judge their applicability and usefulness ‘within the realm of experience’, to adapt McGinn’s phrase.

What is it that Reid says about secondary qualities that we need to keep in mind? The two fundamental presuppositions which underpin the debate must be recalled, viz. that we perceive only our own Ideas and that these Ideas bear no resemblance to the qualities and properties of objects. Now Locke,

having found that the ideas of secondary qualities are no resemblances, was compelled, by a hypothesis common to all philosophers, to deny that they are real qualities of body. It is more difficult to assign a reason, why, after this, he should call them secondary qualities; for this name, if I mistake not, was of his invention. Surely he did not mean that they were secondary qualities of the mind; and I do not see with what propriety, or even by what tolerable licence, he could call them secondary qualities of body, after finding that they were no qualities of body at all.\textsuperscript{98}

The “hypothesis common to all philosophers” is the notion that we know the world since “the mind, like a mirror, receives the images of things from without, by means of the senses”,\textsuperscript{99} and Reid immediately points out, quite sensibly,

\textsuperscript{98}Reid (2000, p. 93), emphasis original. Reid was wrong about the name; Boyle used ‘secondary qualities’ first: “I say not, that there are no other Accidents in Bodies then Colours, Odours, and the like; for I have already taught, that there are simpler and more Primitive Affections of Matter, from which these Secondary Qualities, if I may so call them, do depend”; Boyle (1666, p. 43). Locke read Boyle’s \textit{Origine of Formes and Qualities} in the year of publication. The arguments presented in that work still exercise philosophers today. For example, Clark explains that “without the living animal sensing such things, these ‘secondary’ qualities (to use the term introduced by Locke) would not exist”; Clark (1993, p. 6). Boyle denies just this, explaining that “Coal will not onely heat or burn a Man’s hand if he touch it, but would likewise heat Wax […] though all the Men, and sensitive Beings in the World were annihilated”—hence glowing coals really are hot; Boyle (1666, p. 43), emphasis and spelling original except for the replacement of the long s.

\textsuperscript{99}Reid (2000, p. 91).
that although the secondary qualities

which, according to [Locke’s] principles and reasonings, were no qualities of body at all, hath led, not the vulgar of all ages only, but philosophers also, and even the disciples of Locke, to believe them to be real qualities of body: [Common Sense] hath led them to investigate, by experiments, the nature of colour, and sound, and heat, in bodies.\textsuperscript{100}

Whereas the vulgar believe naively that objects are coloured, philosophers reason that colours exist only in minds, but by their investigations of the nature of colour act with the vulgar and thus prove the incoherence of their position. This point is complementary to the objection to Reid’s assertions about hardness on page 49 above. There it was argued that hardness, and by extension any primary quality, does require investigation in terms of what it is, how it relates to our experience, and to any other relevant properties of matter. Whether it be known directly or not is not relevant to this. Here, in connection with secondary qualities, Reid is asserting that these are investigated in just the same way, despite any assertions by philosophers dismissing their objective existence.

It may be objected that Reid has misrepresented Locke and the subtlety of Locke’s doctrine. Locke is, after all, not denying that objects have powers which evoke our sensations in a lawful manner.

Still, what Reid points out clearly is that insisting on the lack of resemblance does not remove the relevant qualities from the world, it merely renders them relative in a specific sense. Whether they should then be called qualities, or properties, or powers, or dispositions, is largely a semantic issue. But calling them ‘secondary’ is unenlightening and Reid notes that “I would rather chuse to call them relative Qualities, because all we know of them is their Relation to certain Sensations in us which they are adapted to raise”.\textsuperscript{101}

The word ‘relative’ can be construed in many different ways. The one that is seminal for our purpose can be clarified by noticing a third kind of quality entertained by Locke. As before, he calls these ‘secondary qualities’, and they are again powers, but not powers of objects to affect the mind, but to affect

\textsuperscript{100}\textsuperscript{100}Reid (2000, p. 93).

\textsuperscript{101}\textsuperscript{101}Reid (2000, p. 227) where the note continues that Reid would also have used ‘occult’ “if the word was not in disgrace”. The word ‘occult’ will continue to be used in what follows because it is old, used by Boyle, and it can simply mean ‘hidden’ without suggesting that someone did the hiding; anyway, ‘relative’ is now also in disgrace.
other objects and substances in the way that, for example, “the sun has a power to make wax white, and fire to make lead fluid”.\footnote{Locke (1977, p. 63). Locke is evidently following Boyle’s lead on this.} We do not imagine that the liquidity of the lead or the colour of the wax are copies or resemblances of something originally in the fire or sun.

Whatever may be made of the usefulness of this category in explaining the consequences of exposure to the sun, we have here an interesting scheme of relations for epistemology. How is one to learn something of some subject or object? Only by allowing it to enter relations. These may be comparisons of like with like (as in measurements of length), but Locke points to something more interesting. Considering his examples, we see that interactions inform on all the interacting parties.

Take a king, say, skilled in commanding. He commands the jester to juggle and the minstrel to sing. As powerful as he may be, he cannot change the bidding willy-nilly and make the juggler a singer or vice versa. The effectiveness of the command does not consist solely in the power of the king, but also in the ability of those commanded to carry it out.

Such relations go some way beyond comparing like with like. For Locke, the primary-secondary distinction is—whatever argument is used to validate it—unproblematically about resemblance and unlikeness. On the authority of the scientists (and Locke’s own consensual intuitions) he knows which of our ideas of sense resemble the qualities of bodies and which do not. Whether this can be made intelligible or not, or even whether one doubts, in a Berkeleian mood, that a perceived length cannot be aligned to an inherent length without claiming ridiculously that my perception is long, instead of being a perception of something long, is beside the point, since we see that in asking after resemblance, the question posed is already one of a highly specialised sort.

Relations naturally include comparisons according to one or more properties, but such comparisons do not exhaust relations, and the reminder that interactions inform on all the participants should be taken to mean that the relation entered into is one of the participants in any interaction. This is implicit in the example of the commanding king. The king cannot act in some unspecific ‘kingly’ manner, which is not at least potentially available to other rulers and also meaningful in calling forth some appropriate responses from his subjects. Were that possible, we would know neither how to respond, nor recognise the king. The implication is that for any relation, the relata and the relation are a self-consistent unity, and any knowledge of each (if it is to be at all possible) is partial knowledge of all.
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Put in this abstract way these considerations sound speculative and metaphysical, but they will be illustrated in the next section by a brief look at our common sense theories of colour and location, and how these theories fare through the first critical steps beyond common sense. The reason for insisting on these points here is the common inversion of priorities between order and comparison which suggests that understanding is based on measurement, rather than the truth, which is the other way around. It is all too easy to forget that before it makes any sense to undertake any comparison or measurement, one must be committed to the idea that two things are comparable, or that one can be used to measure the other. If anything in epistemology can be called primary, it is not comparisons of like with like; it is the orderly relation.

If we somehow already had a good grasp of what kind of a relation perception is, then these generalisations would just complicate matters unnecessarily. But it is clear that if there is one thing regarding which we are deeply in the dark, it is just this relation. We don’t even know what a sense is, and the theories of perception mentioned thus far invoke the simplest of relations between two principles, which according to various accounts have little or nothing in common. Such, at least, are the conscious sensations and the corresponding but occult physical mechanisms invoked in Reid’s epistemology, but as much could be said of object and idea, a representation and that represented, and other derivative couples.

The key point now is that even assuming that simple relations obtain in these couples, they can only be elucidated and tested within a system of possibilities which, we must continually remind ourselves, is only partially known. One principle of comparison applied indiscriminately is not the whole story.

It is not difficult to see what happens when relations are removed from the problem and correlations or comparisons sought instead. Firstly, what is important about comparisons is that they are passive, or put in a related way, external. One does not change the shape of the teapot by measuring it. Secondly, what is important about secondary qualities is that they tell us nothing about the relation, there is merely an inexplicable correlation or coincidence. God-given, as Reid so perceptively styles it.

Now Locke should disagree. When he considers “how bodies produce ideas in us” he asserts that it “is manifestly by impulse, the only way which we

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\(^{103}\) Complications from Modern Physics might be quietly ignored here but it would in any case be inappropriate to attack assumptions of the universal applicability of simple comparisons by reference to exotic phenomena. What is said here is intended to apply to the ordinary and commonplace. Further, seeking authority from some particular physical theory would employ the strategy disputed above.
can conceive bodies operate in”.\footnote{Locke (1977, p. 59), emphasis original.} This Epicurean remark has an interesting history with Locke. He was not as sure as he sounds here. The first edition of the Essay has a longer statement which does not mention ideas “in us” but describes “how Bodies operate one upon another”.\footnote{Hill and Milton (2003, p. 19), emphasis original.} This has to be by touch and conveys only motion. This is a substantive reductionism, asserting that exchanges of heat, chemical reactions and in fact all interactions can be reduced to touching and pushing. The popular story is that Locke later cut this under the influence of Newtonian ideas about action at a distance—and Locke himself acknowledges as much—but the shift from interacting bodies to the generation of ideas in us is a dramatic one, and a reductionism of quite a different sort. If Newton is being accommodated, it is in a rather peculiar manner. On the one hand, the necessity of contact between bodies has been dropped, on the other, the necessity of impact for perceiving is asserted. There is a weakness of the imagination operating here. In an epitome of the Essay drafted earlier and published in French, Locke confesses this:

> The next thing to be considered is how bodys operate one upon another & the only way intelligible to me is by impulse; I can conceive noe other.\footnote{Quoted by Hill and Milton (2003, p. 20).}

At least he is candid. By distinguishing Ideas from Qualities, Locke has been bending over backwards to stay in accord with a Cartesian ontological dualism—the same dualism which Reid thinks the vulgar understand when they might say ‘it is cold’ indifferently to ‘it feels cold’—but then suggests, rather improbably, that he can conceive a simple mechanism whereby this dualism is overcome. That mechanism is impulse following contact, an image taken from the sense of touch, dressed up with more imagery from the sense of sight.

Boyle, who is the most important contemporary source of ideas on properties and qualities,\footnote{For background on Boyle’s central role in developing the fundamental attitude of modern science, see Shapin (1994). Valuable material specifically on qualities can be found in Anstey (2000) and Hunter (1994).} is more circumspect on both reducing bodily interactions to impulses, and reducing perception to the same. His explorations of these matters are subtle and fascinating, and there is much to learn from his writings, but an attempt to do justice to these ideas would require a considerable
excursion, so noticing a couple of key possibilities must suffice.\(^{108}\) There is some motivation, in investigating manifest nature, to distinguish many different kinds of qualities. Boyle spoke of primary, secondary, manifest and occult, sensible and even cosmical qualities. His beautifully named cosmical qualities of bodies are those

which because they depend upon some unheeded Relations and Impressions, which these Bodies owe to the determinate Fabric of the grand System or World they are parts of, I have, till I can find a more proper Appellation, thought fit to name their Cosmical or their Systematical Qualities.\(^{109}\)

Boyle’s distinctions and definitions are not trivially related to those of Locke and his followers, and Boyle is open to the possibility that not all interactions are mechanical, as well as the idea that any reduction of sensible qualities need not be a reduction to external relations. One of his famous tropes is the self-consistency and belonging exemplified in a lock and its key.\(^{110}\)

To put all this simply, it may well be that understanding perception will require a consideration of both the external and internal relations between perceiver and perceived in the evidently asymmetric perceptual event, as well as other relations of either partner to other entities and events. For epistemology, perception is one, or perhaps the only, fundamental relation, and there is nothing but prejudice to tell that it must be an external relation of copying or of regular coincidence.

It should not be concluded that Locke’s ideas have nothing at all to recommend them. Nor should the above be read as a suggestion that physicists are incapable of dealing with anything but the simplest relations. Not only is self-consistency basic in physical theory, the composition of diverse causes is well-established, and some of the most extravagant cosmical interdependencies have been proposed by physicists such as Boyle and Newton.

However, understanding sense perception is more than seeking regular coincidences or trying to quantify sensations. In the bigger problem of classifying the senses and our perceptions into genera and species, we have a cosmological problem on our hands. It must be asked what the perceiver is doing,

\(^{108}\)I am much indebted to John Henry for information on Boyle. See Henry (1994).

\(^{109}\)Boyle (1671, p. 3, Of the Systematical or Cosmical Qualities of things), emphasis and spelling original except for the replacement of the long s. See also Henry (1994).

\(^{110}\)Boyle (1666, pp. 16–19).
what the (physical) object of perception brings, what the biological organism and its ecological stance permits and enables, and what is contributed by the social milieu which, at least in humans, deliberately nurtures the perceiving individual.\textsuperscript{111} With Boyle, we should

\begin{quote}
consider \ldots that the faculties and qualities of things [are] (for the most part) but certain relations, either to another, as between a lock and a key; or to men, as the qualities of external things referred to our bodies, and \textit{especially to the organs of sense}.\ldots\textsuperscript{112}
\end{quote}

And again,

\begin{quote}
\text{a Body is not to be considered barely in it selfe, but as ’tis placed in, and is a portion of the Universe.}\textsuperscript{113}
\end{quote}

The usefulness of Boyle’s attention to kinds of relations is worth illustrating with a couple of familiar examples.

\section*{3.4.2 Common Sense on Colour and Location}

It is instructive to note, and ponder, that in addition to what the learned may propose regarding inherent or relative properties, and dispositions or powers of perceived objects, we all, in so far as we are ‘vulgar’, still rely on common sense theories. Where these theories originate and how they develop is a good problem. What these theories are can, however, be examined separately.

What is the common sense theory of colour? Obviously that objects are coloured. To normal sight in daylight this is vividly evident. But are objects still coloured in the dark? Common sense has no answer and it may be a trick question. There is no way to check in the dark but we usually maintain that the teapot is red, the cat is black, and so on. This grammar suggests an inherent property, and disputations about the truth in the dark or in the country of the blind offer only learned opinion.

Interestingly, a little reflection shows that this view of colour as inherent must be wrong. To determine the colour of anything a sensor (perhaps with a

\textsuperscript{111}This is not a suggestion that humans are unique, only that the brain in humans is so plastic that, of all organisms, humans most clearly fail to develop into fully functioning adults if removed from their social context.

\textsuperscript{112}Quoted with emphasis in Anstey (2000, p. 86).

\textsuperscript{113}Boyle (1671, p. 35, \textit{The History of Particular Qualities}), spelling original. Boyle never tires of repeating this sentiment. See also Anstey (2000).
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recording device) and some light is needed. What the sensor will sense depends on its sensitivity, the object and the light. It makes no sense at all to claim that an object has an inherent colour in a universe devoid of the kind of energy which we call light.

The sensor does not have to be sentient for us to determine a colour. It could be a photodiode and if we had no eyes, colour would for us be as occult as magnetic flux is, but object, light and sensor are all required. No amount of talk about surface reflectance, atomic structure or other such ‘inherent’ structural properties will overcome this threefold relativity.

Now while representationalists such as Jackson talk of colour as a secondary quality, and Reid would call it relative in the sense that the sensation is a regular sign of some occult power or action, it might be better to call it a tertiary quality to acknowledge the three participants. It is even better to borrow Boyle’s terminology and call colours cosmical, since they belong to the “grand system or world they are part of”. Just as Boyle points out that in addition to their metallic constitution the lock and key determine each other, and their form is incomprehensible apart from their belonging to each other, so is the eye made for the light.114 We do not see the light, of course, but objects, where light meets more ponderable matter. How this ecology and interdependence arises is a question additional to the fact that it is there. Nevertheless, that fact is undeniable.115

In contrast to the common sense theory of ‘inherent’ colouring, our theory of location is relentlessly relational. Any answer to ‘where?’ will offer relations to other objects. Any answer to ‘how far?’ or ‘how big?’ will offer the same, and units are originally based on the body (foot, inch = 1/12 of a foot, fathom) or on using the body in walking (yard). Distance is, of course, a part of location. Here the relation seems to not only unproblematically involve only two participants, but it is external. Comparing two objects does not change them,

114It is interesting to note that light is integral to some of the most important theoretical developments in physics, from Newton’s refrangibility of rays, to Young’s wave theory and his trichromatic theory of vision, Maxwell’s electromagnetism, Einstein’s relativity, Planck’s quantum hypothesis, Bohr’s atom, and the list goes on. If any principle in nature can be said to participate in “unheeded relations”, then light surely qualifies.

115The relation between eye and light was already evident to Goethe: “The eye may be said to owe its existence to light, which calls forth, as it were, a sense that is akin to itself; the eye, in short, is formed with reference to light, to be fit for the action of light”; von Goethe (1970, p. liii). That this was clear to Gibson can easily be gathered from, for example, Gibson (1986). Most importantly, Gibson had the insight to realise that “eyes evolved so as to see the world, not a picture”; Reed and Jones (1982, p. 20).
or call upon any specific action or reaction from them. Although comparative terms such as ‘larger’ join two relata, the elephant does not grow simply by being measured against the cat.

It is somewhat ironic that this simple scheme is also in question. Philosophers such as Jackson and McGinn insist on extension being inherent. It is prudent not to challenge intuitions, but if we neglect size and ask for location, i.e. where the lonely teapot is (the one in an otherwise empty universe), then any answer available is evasive and useless.\textsuperscript{116} Physicists generally go in the opposite direction from inherence, making suggestions which amount to making extension a cosmical quality.\textsuperscript{117}

Of more immediate interest is the fact that there are two common sense ways to deal with location: the personal and the objective. The personal, or egocentric, refers to me, while the objective usually refers to landmarks. Only one is needed to find anything (although convenience may favour having both), and the main difference can be seen to be attitude and the social norms of the perceiver.\textsuperscript{118}

These initial remarks are placed here because everything that needs to be said about seeing and touching and the other senses will involve our natural ways of dealing with extension and location. Basic misunderstandings on this cause tremendous confusion, and the muddles are only multiplied when bits of highly sophisticated analysis are thrown into a pot bubbling over with common sense.

To clarify what is meant by this, let’s reconsider the idea that the common sense theory of colour styles it as an inherent quality of objects, and that that is wrong. If the mistake in saying this was not already apparent above, it must be stated explicitly now. Our perception of colour is not a theory in the sense of something discovered, or deliberately formulated, in order to serve our needs for explanation. The constancy of the colour of objects is not a fact about objects, but a pointer to the contribution we make to the phenomena as we experience them. Colour constancy is our \textit{requirement}. It is not, to be sure, the result of individual achievement, nor is it the only remarkable contribution that we make to ‘the appearances’. As anyone can discover by playing with a camera (preferably with any sophisticated image processing disabled), the

\textsuperscript{116}It might be suspected that if there is no hope of finding it we can safely dispense with its existence, but my intuitions fail me utterly when I consider how large this universe, endowed with just one teapot, might be.

\textsuperscript{117}For the importance of Mach in this tendency see Blackmore (1972).

\textsuperscript{118}For an interesting example of a cultural norm quite different to ours see Everett (2008).
visible world is illuminated very unevenly; the colours of objects vary wildly with the weather, location and time of day (not to mention under artificial lighting); and the forms of things change with viewing location. Our ‘common sense theory’ cannot be wrong because it is not a re-description of how visible things ‘really look’, but a tool which helps us achieve particular ends. In so far as it is adequate for our needs, it is neither right nor wrong, but useful. It is simply more useful to have limited contrast so that we notice detail in the shadows, and to have colour constancy so that we readily recognise individual objects without having to constantly keep an eye on them.\footnote{It is even possible to systematically see colours which are entirely absent from a scene, and, judging by the sensitivity of the red cones in our eyes—which are actually insensitive to red but sensitive to yellow-green—we see one of the most vivid colours (fire engine red) by its absence rather than its presence. As a Gestaltist might put it, we see red as we see a figure by using the ground. For the cone sensitivity curves see, for example, Ings (2007, p. 227) and Mollon (1982, p. 174).}

Seeing colour as belonging to objects is one thing, understanding it as a cosmical quality is something else. That understanding may or may not change our way of looking, but if we are to understand how our senses work we cannot be content in using them without thinking. It must be stressed that it is not a good idea to elevate our biological adaptations and social requirements into metaphysical principles about objects and their qualities. Perceiving is a thoroughly relational transaction, even though it is often desirable to forget the main player—the individual perceiver—and concentrate on dealing with the objects perceived.

### 3.5 Summary

The problem of how many senses we have is largely ignored in the philosophical mainstream. There is no explicit denial of the fundamental importance of the senses in our engagement with the physical world, but when the senses need mentioning the most common tactic is to offer an incomplete list: an ‘\textit{et cetera} enumeration’. The membership of this list is commonly chosen from the traditional five and occasionally supplemented by bodily feelings.

Going beyond this general neglect of the senses is a philosophical debate specifically on the counting problem, which can be said to begin in some remarks on counting criteria by Grice. Several different currents can be discerned in the debate. One of these consists of efforts to justify or explain why five senses are counted. Another concentrates on problems with a philosophical
understanding of subjective experience, and generally offers arguments why sensations are irrelevant or unhelpful when the senses need counting. Yet another can be characterised as a narrow concern with specific criteria, brought in to address this or that particular problem. These streams are not separate.

The central issue in the debate is the status of subjective experience and the iconic sensations of colour, sound, odour, etc. Although, as O’Dea says, the basis for differentiating between senses is experiential, the participants in the debate do not point to the difference between colours and sounds as the basis for dividing sight from hearing; all are seeking other reasons. A possible exception is Clark but his aim, in line with traditional psychophysics, is to quantify sensations rather than provide a count of senses.

In defending a count of five, Grice brings in ordinary word use as if this could supply reasons for how the senses are counted. In related arguments, Nudds suggests that the count of five is conventional but this leaves the universality of the naïve count unexplained. O’Dea suggests that in perceiving we are aware of the organ being used, and argues that this awareness (and not the differences between sensations) explains the number. Although proprioceptive knowledge is undoubtedly part of the perceiver’s experience, this is not the same as an awareness of which organ is being used and it fails to explain the count of five. Two other suggestions, based on the biological utility of separating the senses and the richness of sensations—roughly speaking the dimensionality of variation—are considered and dismissed because they too fail to explain the traditional result.

It is then proposed that there is no mystery in the traditional count. This is based on the iconic sensations and is conservative in that the five senses are ‘external’ in primarily providing intelligence of remote or previously remote objects. This does not mean that the stimulus is physically external but that the stimulus can be relatively easily isolated from the bodily response. Senses of warmth or pain are not counted traditionally because these have as much to do with the state of the perceiver as with the influence of the external object.

Consideration of the counting criteria is introduced by considering Grice’s list in which the stimulus is counted twice—once as a property of an object and again in the physical conditions attending sensing—and the behavioural criterion is ignored. Grice does not consider all his criteria, and merely struggles with the assumed independence of a sensation and the corresponding property or quality of the perceived object. Coady objects to this by pointing out that publicly assessable behaviours must have a role to play and that sensations
are objectively inscrutable. Keeley goes one step further in arguing that when scientists study animals, reports of sensations are unavailable and hence they have no role to play in a ‘scientific’ account of sense perception.

Apart from ignoring a large part of cognitive psychology in favour of the more esoteric practices of ethnobiology, Keeley’s argument for the elimination of sensations is unsound, since he himself introduces sensations through his reliance on psychophysics and his objection to Gibsonian ecological psychology. Ross contributes to the debate by indirectly pointing out the importance of sensations through the inclusion of ‘mental qualitative properties’ which may or may not enter awareness.

In many of these arguments one finds an inversion of the usual scientific reliance on the phenomena of direct experience and a substitution of a theoretical discourse for the facts, with the discourse presented as if it offered descriptions of reality unencumbered by the usual need to consider how the theory is arrived at and validated. This inversion can be discovered in various accounts which deprecate the primacy of sensations or experience, be they couched in terms of the physical interactions of materialistic science or the behaviouristic explanations of evolutionary biology.

The attack on subjectivity evident in deprecating the role of sensations points back to a problem with the concept of a sense. If the working concept of a sensation is that it is indeed private and inscrutable, then attempting to eliminate sensations is understandable, but if this amounts to an elimination of subjectivity, then something is amiss. The problem is traced to the felt need to validate subjective experience in some realm external to it, and since only theoretical models are available for this quest, it is a version of the substitution of abstract theory for experienced fact.

An alternative to this unworkable procedure is to admit subjective experience as ineliminable in perceiving, and to investigate perceptual relations as always involving in a threefold manner the perceiver, what is perceived, and the relation itself. This alternative need not abandon the procedures of current science, it merely extends the range and complexity of the relations studied.

The meaning of this is illustrated in two steps by considering the distinction between primary and secondary qualities. Some defenders of subjectivity, i.e. the existence of sensations or qualia, make the mistake of first admitting the existence of a divide between subjective experience and an ‘external’ or ‘public’ world of primary qualities. They only then argue that the subjective, albeit private and howsoever inscrutable, still cannot be dispensed with. Un-
Fortunately, this already makes room for the elevation of a theoretical discourse above the authority of subjective experience and consequently robs subjectivity of any significant role in the process of perception.

Another way is possible. By refusing to accept that the divide between primary and secondary qualities is anything but a heuristic device, theoretical discourse is returned to its ordinary status as derivative of experience, and the full range of experience is opened to scientific investigation. As Reid already pointed out, scientists have always investigated the regularities in the appearances of secondary qualities. In that way, they placed them on a par with all aspects of experience, if not exactly by what they said, then at least in what they did.

In investigating perceptual relations there is no methodological imperative to consider only the relations found in simple mechanical models or in making measurements. However, accepting the primary–secondary distinction uncritically can lead to misguided attempts to reduce sensations to ‘more real’ underlying processes, usually using models of perceiving which are extraordinarily primitive. These models include Reid’s inexplicable correlations used in various versions of psychophysical parallelism; the external comparisons, such as the resemblances of various kinds of representationalism and the spatial metaphors of psychophysics; and Locke’s movement of the mind by the impact of objects.

Locke’s sketchy doctrine of qualities can be contrasted profitably to the ideas of his scientific mentor Boyle. Apart from the usual simple relations, Boyle speculated on hidden and cosmical qualities which assume the primacy of a self-consistent system. When faced with the problem of understanding perception, with the irreducible presence of subjectivity complicating matters, it seems advisable to adapt the method to the problem at hand, admit that a large part of the problem space may still be hidden from view, and investigate regularity without prejudice. This certainly appears to be a better alternative to forcing the problem into a crude heuristic.

The intimate relations between perceiver and what is perceived are illustrated by the common sense theories of colour and location. Although the common sense theory of colour places it in the physical world, the colours actually seen depend as much on the demands of the perceiver as on the properties of the object. Physical location is recognised in ordinary ways of dealing with it as a relational property. Anything which could possibly be called location arises only between two participants.
3.5. SUMMARY

Putting relations centre stage allows us to dispense with epistemically mysterious inherent properties and advises that the full range of experience—not just the iconic sensations—needs to be considered before the senses can be counted. It also offers the opportunity to return theory to its proper domain, as a useful and economical description of the orderliness discovered in the world by systematic investigation. One does not have to subscribe to a radical phenomenalism to see the attraction of dealing with just one world, and to agree with Mach that “the main thing is the abolition of an unnecessary doubled existence [i.e., ‘appearance’ and ‘reality’]”.\(^{120}\)

The naive tradition counts five senses and the iconic sensations belonging to each sense—the proper objects of sense—are distinct: there is no vagueness or confusion in what a sound is, sounds cannot be confused with smells, colours with tastes, or one sense with another. The main problem with this tradition (and the main reason why the discoveries of science seem to undermine it) does not follow from the fact that the tradition is mistaken regarding the distinctness of those sensations. The complications arise from the failure of the naive view to acknowledge the full spectrum of the world of sense experience—selecting out and attending to just a few sensations—and of the interactions between the individual perceiver and whatever comes to meet them. Modern subjectivity all too easily separates the lone perceiver from the world perceived, and one sense from another. Our next task is to show how profoundly mistaken we are in accepting these modes of separation as given.

\(^{120}\)Quoted in Blackmore (1972, p. 174).
Part II

Do the Senses Work Independently?
Chapter 4
Dynamics and Space

We have seen that the counting problem is difficult partly because the criteria used for counting do not fit together. A coherent account which does justice both to sensations and scientific descriptions of the stimulation of organs is unavailable.

A common suggestion for overcoming this difficulty is to downplay the importance of sensations. This takes various forms, and some of the arguments and suggestions offered in efforts to sideline the importance of sensations were examined in part I. What they generally have in common is an inversion in the proper ordering of the credence given to experience on the one hand, and a theoretical explanation of that experience on the other. Experience, in the guise of the appearances or private sensations, is taken to be globally deceptive or illusory, or even unavailable for scrutiny, while formal theory is put forward as an account of the underlying reality. This fails to pay heed to the historical fragility and multiplicity of theory and the necessity of grounding the theory in experience. As Iain McGilchrist put the point in a closely related context, “the one thing we do know for certain is that everything we know of the brain is a product of consciousness. That is, scientifically speaking, far more certain than that consciousness itself is a product of the brain”.\footnote{McGilchrist (2009, p. 19).}

In examining the criteria used to help with the counting problem, we found that—judging by some of the contributions to the debate—even understanding the traditional count is a challenge. But it is difficult to see why that should be, unless one is resolutely trying the ignore the straightforward solution: the immediate qualitative differences between the iconic sensations, with their rather direct and easily confirmed association with the outwardly directed organs of
the head senses—eyes, ears, nostrils, tongue—and in the case of touch, the outer surface of the skin. This orientation towards remote objects (already clear in calling these senses the outward wits or ‘external’), coupled with a conservative separation of the perceiver from remote objects, points to a satisfying account of the naive count, provided that one does not confuse matters by ignoring the iconic sensations and bringing in proprioceptive knowledge of which organ is being used. It does not seem to have occurred to those who advocate individuating the senses on the basis of proprioception, that this only brings in more sensations, and there is nothing to be gained by refusing to consider the sensations which everyone is routinely aware of, and relying instead on sensations which are mostly subliminal or only intermittently noticed.

Both counting and, more modestly, justifying the traditional count have to do with aspects of individuation. The main problem is how sensations are individuated and classed together. Part of this problem is the question of what information these sensations convey. The key question from the naive viewpoint which arrives at the conservative count of the senses, is whether the sensations tell us about objects, or whether they signal our reaction or response to these objects. Touch is a rather troublesome sense in this context, since this separation is somewhat fragile. As noted in connection with hardness, identifying the property of the external object is a trick of the attention. Touching is also called ‘feeling’, and we see from the ambiguity in that term how closely the sensations of touch are associated with our bodily feelings, such as pains and even our emotions.

It is proper for a critical count of the senses to begin by asking how sensations are individuated, or at least how classes of sensations are differentiated. When the question is put this way and colours, sounds, smells, etc. are considered, then it would seem that it has no answer. Smells simply are self-evidently different from colours, and no amount of additional speculation about which organs we are moving or using will explain the difference nor, it would seem, will any amount of training in the use of the body convert sounds into tastes. It is a matter of ‘if you don’t know what it’s like to see red then I can’t tell you’.

Since the prospects of making progress in this way are dim, a better question is needed. Three considerations which can already be found in Aristotle provide valuable clues. Firstly, since touch has many clearly different sensations, perhaps we should reconsider touch in order to see how some of those body senses identified by the physiologists and excluded from the conservative
count might be related to the traditional five. Secondly, since the traditional count is conservative precisely in that a separation between the perceiver and the object of perception is substituted for an exploration of the kinds of interrelations which inform the perceptual process, what Aristotle said about hardness is a promising starting point. In treating touch, and how in the process of sensing what is potential in the organ becomes actual when something is touched, Aristotle thinks he has explained

why we do not perceive what is equally hot and cold or hard and soft, but only excesses, the sense itself being a sort of mean between the opposites that characterize the objects of perception.\(^2\)

It is plain from the context that what is meant is that we perceive as hot or cold only that which is hotter or colder than the relevant organ, such as the hand, and this is true enough. But what happens on occasion to be felt to be hard or soft is complicated by dynamic aspects.\(^3\) Even if there is no movement, judgements of hard and soft are based on pressure and this amounts to an opposition of forces. Thus, if one wishes to do justice to this topic (without blundering into mistakes such as thinking that since we do not normally feel air pressure then air and the body must be equally hard or soft), an examination of dynamics is called for. This begins with inertia and force, action and reaction.

Bringing in dynamics is still not enough. The important step is to replace asking how the iconic sensations differ with asking what they have in common. Aristotle’s approach to this is to distinguish the sensations, or proper objects of each sense, from the common sensibles which are known by more than one sense. These common sensibles are movement, rest, number, quantity and figure.

Much depends on how this question of what either senses or sensations have in common is dealt with. Trying to deal with it historically, for example by trying to trace the transmutation of the five common sensibles into Boyle’s primary qualities of bodies, may be a fascinating but roundabout endeavour. Alternatively, if one begins with the sensations themselves and gets distracted by striving to answer this question of what they have in common in a ‘scientific’ manner by talking about strength or intensity, the number of oppositions and contrasts, or the dimensionality of the space of variation—as one does when dealing with the psychophysics of colour and applying the quantitative and

\(^3\)See also section 2.1.3.1 on Reid’s approach to hardness.
geometrical tools of the exact sciences—then the similarities are merely formal, and the question of individuation is sidestepped. But if we notice instead something as simple as the fact that all sensations are ordinarily *localised*, then the path to solving the puzzle is found. However, it is not enough to consider location. A deeper look shows that the full complexity of the question emerges only if the richness of dynamics is allowed into the problem space, and it is here that Aristotle’s mention of hardness is useful. The question is not then ‘how is it that sensations are localised?’, it becomes, more fundamentally, ‘how is it possible to perceive objects at all?’

We shall see that the best place to start on the problem of individuating and separating the senses is to turn away from the traditional five, leave the stipulation that a sense must be used to perceive ‘external’ objects aside, and consider the sensations which are most intimately bound up with dynamics. These are the bodily sensations known to everyone in their efforts to perform any kind of action. It is thinking about these sensations that leads directly to dynamical insights, and with these, an understanding of motion and location.

What will be revealed in this way is that there is a sense which is fundamental in making it possible to express our agency. This sense is the sense of balance. Apart from its remarkable role in allowing us to participate in the physical world, considering it can overturn prejudices on what should count as a sense and how the senses interact. The sensations of balance are always complex and multimodal. Once this is realised and the traditional senses are re-examined, we will see that all sensory experience is multimodal, that balancing is constitutive of this experience, including the experience which we usually call hearing and seeing, and that the separation of the senses is not a given but in some respects a cultural achievement.

The claim that the senses do not operate independently will be approached by first considering the sense of balance, its discovery, its complexity, and its relation to dynamics. From this starting point our apprehension of spatial relations can be clarified and some of the complexity underlying each of the traditional senses can be fathomed. This is done mainly by considering bodily sensations and touch in this chapter.
4.1 The Preconditions of Agency

Helmholtz once noted that “next to the loss of life itself that of eyesight is the heaviest”.\(^4\) Helmholtz was wrong on this; it is perfectly possible to lead a rich and satisfying life without eyesight, and there are worse losses.\(^5\) But what if we had to choose a sense without which individual life would be worthless? Is there one? Which would it be?

As a matter of fact there is such a sense, and it is neither of the two most ancient senses—ancient in evolutionary terms—of touch (cutaneous pressure and warmth) or taste-smell (chemical sensitivity), even though both of these are arguably essential for bare survival. The one crucial sense is the sense of balance. The reason for this is simple: it is impossible to become a self-conscious agent without balance. It is indeed impossible to become, in the physical world, any kind of individual agent without it.

It is of course possible to retain the kind of physical agency exhibited by the inertia of a stone, but that is not a life, let alone one worth living. To see why, we must first distinguish action from behaviour. As Jeff Malpas explains:

> Action can [. . .] only be explained as action—rather than as mere ‘behaviour’—inasmuch as it is related to some set of beliefs, desires and other attitudes, as well as in relation to other actions and propensities to action. Put simply, for an item of behaviour to count as action is just for it to be explicable in terms of reasons attributable to the agent. Behaviour that cannot be explained in this way may well be caused by states internal to an agent’s body or brain, but the failure of any rational connection with states of the agent means that such behaviour cannot be viewed as action.\(^6\)

Given that action is informed by reasons, it must nevertheless be spelled out that these reasons can only become manifest through activities which strive to achieve a goal. To put it plainly, action is always directed; in terms of movement it has a from-to trajectory, and this relies on anchoring some reference

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\(^4\) von Helmholtz (1968c, p. 64).

\(^5\) The background to the remarkable historical and philosophical battles over language and deafness is treated by Réé (1999). A remark by Aristotle on ranking senses may be relevant: “seeing, regarded as a supply for the primary wants of life is in its own right the superior sense; but for developing thought hearing incidentally takes the precedence”; Barnes (1984, p. 694, Sense and Sensibilia).

\(^6\) Malpas (1999, p. 93).
frame as ‘here’ and striving from that perspective to reach something, or go somewhere, or say something.

To be sure, the structuring of the agent’s awareness in terms of orientation, location and perspective has been recognised. In relation to space and place, Malpas notes that

a creature cannot be said to have a grasp of space, nor a grasp of the concept of space, unless it has a grasp of space, or of the concept, sufficient to enable it to locate and orient itself. […] More generally […] a creature’s subjective space is precisely the space of that creature’s own involvement with the world—the space of awareness within which it acts and with respect to which its actions are oriented and located. For this reason, we might also characterise such a space in terms of the notion of perspectivity—a subjective space is therefore an intrinsically perspectival space.7

Our first task in examining the bodily senses is to uncover the specific senses active in achieving orientation, and exploiting dynamical relations in goal-driven activity. The sensory links between the perceiver’s aims and their physical realisation need to be made fully explicit.

4.1.1 The Discovery of Balance

The set of organs enabling orientation and dynamical reference in humans is a complex assembly called the vestibular apparatus. The organs are closely associated with hearing and we have two sets, one located behind each ear and protected by thick layers of surrounding bone. They transduce the direction of gravity and also angular accelerations in the three orthogonal directions of space, and make this information available, through complex neuronal interconnections and wiring, to the active perceiver.

Although there is a wealth of readily available information on our organs of balance derived from modern research, the most instructive approach to what we now need to know about vestibular functioning and how it relates to our other senses is historical.

Among the important names usually associated with the history of vestibular research are Ernst Mach, whose philosophical fame rests largely on psychophysics and his radical relativism, Jean Pierre Flourens, the famous physi-

7Malpas (1999, p. 50).
ologist who described the organs, and Jan Purkyně, who examined vertigo after rotation.\(^8\) These are all figures from the 19th century, but Nicholas Wade has looked at the early history and there is an unsung hero there. It is William Charles Wells, who was a contemporary and compatriot of Reid, and he deserves the lion’s share of the credit for the early experimental work on how rotation affects our vision.\(^9\)

The point to notice about much of this early work connected to the vestibular organs is that it is not actually about balancing. It is really about vision and how our vision depends on movements and accelerations. The subjects of the experiments on vertigo and nystagmus following rotation were either strapped to a chair and spun about, or simply turned till they got dizzy, as children like to do.

If our main interest is in normal healthy balance, then these performances are only a small part of the story. They tell us a lot about the interactions and conflicts between vestibular function and the vision system, but little of direct significance about balance, and especially agency. To understand the basics of balance, it is better to pay attention to the remarks of someone who does not appear in the historical accounts of the discovery of balance at all: Thomas Reid.

Reid’s explicit remarks on balance occur in a late essay on voluntary motion. This essay appears in the collection called *Thomas Reid on the Animate Creation*.\(^10\) It is called “Of Muscular Motion in the human Body” and it was read before the Glasgow Literary Society in 1795.\(^11\) Wells published his “Essay upon Single Vision With Two Eyes”, with a description of the experiments on vertigo in an appendix, in 1792.\(^12\) Wells knew of Reid and made some comment on Reid’s ideas on vision from the *Inquiry*.

This is what Reid said on balance:

This Power we have of perceiving the ballance of our Body is so like to our other external Senses, that it might very justly have been accounted a distinct Sense, if it had been so much reflected upon as to require a Name.

In each of the external Senses, there is an Impression made upon the Body or on some part of it, which by our constitution pro-

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\(^8\)Some of the history is covered in Hawkins and Schacht (2005) and Wade (2003b).
\(^12\)Wade (2000, pp. 130–131).
duces a certain Sensation of the Mind, and that Sensation is by our Constitution accompanied with the Perception of something external.\textsuperscript{13}

He also remarked on the importance and excellence of this sense:

When we observe with what ease, and Grace those Motions are performed by those who are expert, and compare them with the Laws of Motion, we must be convinced that this Sense by which we perceive the least deviation of the Body from its Ballance, may by Use be brought to a degree of Accuracy which is hardly to be observed in any of our other Senses.\textsuperscript{14}

Contained in these remarks are tremendous insights about the senses, especially if we pay attention to the context, which is a discussion of voluntary movements. Here is a little more:

This sense of Ballance may be seen in a Child of two or three Months old. If sitting upon ones knee he begins to tumble, he immediately starts & endeavours to recover himself; But it is greatly improved by Use, in every Employment that requires its exercise; [...] This sense of our Ballance is produced not onely by the impression made by the power of gravity but by any other Force which endangers the Ballance.\textsuperscript{15}

Reid does make some remarks on vision in the same essay, but these are mainly to do with directing the eyes by means of the antagonist muscles—so he speaks of a balance in the nervous power of those muscles—rather than the cross modal effects studied by those investigating vertigo and imposed accelerations. He is primarily concerned with how active agents use the muscles and notes that:

There are however many voluntary Motions in which some previous Perception of the Understanding is necessary to direct us to the Motion which the occasion requires.\textsuperscript{16}

\textsuperscript{13}Wood (1995, p. 110).
\textsuperscript{14}Wood (1995, p. 111).
\textsuperscript{15}Wood (1995, p. 111).
Not only must we sense how muscles move, muscular exertion is the default state:

Although all voluntary Motion is performed by the Contraction of Muscles, we must not from that conclude that when no Motion is willed, the Muscles are inactive. The Exertion of Muscles is no less necessary to rest than to Motion. In every position of the Body excepting perhaps that of lying prone The reason of this is that there are so many Articulations in the Limbs, & in the Spine & Neck and these in a living Body have such Lubricity to facilitate their Motions that without the Exertion of Muscles, it would sink down to the ground like a Chain of many links. So we see a Man does if he is struck dead or deprived of all power of Muscular Motion in an instant.\footnote{Wood (1995, p. 112), emphasis and punctuation original.}

As already mentioned, a few years before Reid’s remarks Wells published an essay on vision. In an appendix called “On Visible Position, and Visible Motion” Wells speaks about balance. He starts by noting that:

In the estimates we make by sight of the situation of external objects, we have always some secret reference to the position of our own bodies, with respect to the plane of the horizon; and from this cause, we often judge such to be at rest, whose relative places to us are continually changing; and others to be in motion, though they may constantly preserve, in regard to us, the same distance and direction.\footnote{Wells (1818, p. 69).}

The concern here is with the judgement of visible motions. Wells talks explicitly about bodily balance a little further on, saying:

What is there within us, to indicate these positions of the body? To me it appears evident, that since they are occasioned and preserved by combinations of the actions of various voluntary muscles, some feeling must attend every such combination, which suggests, from experience perhaps, the particular position produced by it. But in almost all the positions of the body, the chief part of our muscular efforts is directed toward sustaining it against the influence of its
own gravity. Each position, therefore, in which this takes place, must be attended with a feeling, which serves to indicate its relation to the horizontal plane of the earth.19

Wells then immediately considers how it is that we see objects to be still, despite irregular motions of the body such as are experienced on a ship rolling and pitching. The point is that Wells is really interested in visible position and motion, and how perception of these relates to bodily motions.

Reid, in his essay, is not particularly interested in the perceptions of sight but in the control of bodily movements themselves. Three of Reid’s key points are:

1. Voluntary movements and efforts maintain balance and posture. The implication here is that in using this sense we are active, in that we participate as agents in generating the sensations felt. The perceiver and the actor are one and the same, and if we wish to entertain a passive model of perception such as placing the perceiver in a Cartesian theatre, then we have to allow them to get onto the stage because without their activity and participation, the show simply does not go on.

2. This sense has its own sensations. These sensations are bodily sensations associated with muscles, and Reid did associate balance closely with muscular sensations. These sensations are also normally subliminal, unless we are in imminent danger of falling, or are pushed, and need to act decisively to restore our balance. As Reid might have said, we normally pass over these sensations unnoticed and attend to our other perceptions as we pursue our goals. That does not mean that we are not doing anything in keeping balance. In fact we are always acting, and the sensations informing us of posture and movement are always present.

3. There is evidence of development. Watching infants and young children, rather than normal adult functioning, is helpful. Infants spend much of their time trying to orient themselves and to control their movements. The triumph of this development is getting mobile, particularly in standing up and walking. Even later, we can become more skilled in performing various motions.

There is no need to play Reid off against Wells in a competition on these points. Wells made closely related remarks and here is an example:

19Wells (1818, p. 70).
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Should the necessity of supporting the body against its gravity, by the actions of our voluntary muscles, be suspended in whole, or in part, our judgments of the situation of objects, with respect to the horizon, must become irregular and uncertain, notwithstanding any general habit we may have acquired from experience.\textsuperscript{20}

The main reason why what Reid tells us is exceptional comes from a fourth point, and that is his remark that we should count the sense of balance as an additional sense and compare our achievements to the Laws of Motion. That is a very fine suggestion because it challenges our ideas about what a sense is.

4.1.2 Achieving Balance

Why has balance not been counted as a sense? Although this question takes us back to the counting problem, we must now consider how it relates to the separation of the senses. This is because some of the answers to it currently on offer show a lack of understanding of how we achieve and maintain balance. The issue is intimately related to not only how the senses are individuated, but also to the role that the individual perceiver must play in perceiving.

If it is correct that the traditional count separates the perceiver from the world, that information about our own body, however it is acquired, is separated from perception of external objects and their qualities and properties, and that the count is conservative in that only those perceptions for which it seems easy to draw the line between the objects in the world and ourselves are given to our senses,\textsuperscript{21} then balance would not count as a sense because the separation is not easy. To take one of the participants away in balancing, or any achieved equilibrium, annuls the whole process. And just as pain and hunger are private sensations and their organs not counted along with the external five, the sensations associated with balance, be they motion sickness or the ordinary feel of walking, have more to do with individual vigour, fitness and disease than with sensory perception as traditionally understood.

The naive separation of the senses from the perception of bodily self evidently did not impress Reid, who took the direction of gravity to be external, even if we do come to know it primarily by way of sensations within our body.

\textsuperscript{20}Wells (1818, p. 73).

\textsuperscript{21}This conservatism is now still reflected in calling bodily sensations \textit{private}, as for example Armstrong does when separating the perceiver from the surrounding world. See Armstrong (1968, p. 307).
It is interesting that where Reid speaks of ‘external’, Wells writes about “sustaining [the body] against the influence of its own gravity”. In any case, the naive separation does not survive critical reflection. When we look at the laws of motion, even in the context of Galilean relativity, then the separation of self-motion from motion of objects is not simple after all. It is wholly ambiguous. Even locating stationary objects in space inevitably implicates the perceiver in a relation, just as sticking a cold hand into warm water tells us about the interaction rather than about the absolute temperature of the water.

In one way there does seem to be a natural division of movements: the division between moving and being moved. This is complicated by the fact that motion is not always attended to, especially in habitual movements or the skilled movements that we are inclined to call ‘effortless’, and deliberate movement brings in further complications because we cannot confine ourselves to kinematic descriptions—moving body parts deliberately is always dominated by force and friction, resistance and strain. These are the quantities of dynamical descriptions and dealing with them explicitly can only be avoided by resorting to vague discussions of ‘motion’ in the abstract, while hoping that an imprecision in describing the phenomena is inconsequential.

Before saying more about dynamics and how the sense of balance provides what is needed to understand how the separation between the perceiver and the world implicit in the tradition is unworkable, a reminder of a mistake made in the modern philosophical debate on the individuation of the senses can clarify just how the problem of individuation might be approached most profitably.

When Brian Keeley considers a suggestion made by Anthony Kenny and David Armstrong, that part of what we mean by perceiving is the awareness of moving and using an organ to get information, he writes:

Armstrong proposes [...] that sense organs are bodily structures that we actively use to gain information about the world, as when we open and move our eyes to see or cock our head to hear. But he continues, this runs up against the problem that we do not actively move organs in all the putative cases of sense. For example, we do not do anything to gain vestibular information. It seems to be ever present (which might explain why Aristotle did not remark upon

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22 Wells (1818, p. 70).
23 Already mentioned on page 82.
The use of an organ in active perception does not seem to be of help here. Armstrong in fact does not mention balance or the vestibular apparatus, and does not seem to be interested in orientation when dealing with bodily sensations, but from what Reid and indeed Wells have been telling us, it is easy to see how mistaken Keeley’s comment that “we do not do anything to gain vestibular information” is. If we wish to collect vestibular information, then it is actually what we do and do all the time that matters. If we simply lie down and make no effort, then orientation can eventually be lost. It is also because the collection of this information as part of our efforts is “ever present” that allows it to serve as the basis for the intentionality of our voluntary movements. These movements are intentional in the sense that they have a goal and a desired direction. If we had no up-to-date knowledge of the direction to the objects which we wish to reach, there is no way we could reach out to them.

Since Keeley’s advice is to ignore sensations entirely, it is not surprising that he considers the ‘organ use’ criterion only to replace it with the idea that considering the anatomy, wiring and dedication to a function of the organs is enough. To see the mistake of relying on an awareness of using organs actually espoused, we need to turn to John O’Dea who says that it is an odd fact that some rather obvious senses were never included in the traditional five. The account I’m proposing can explain this, in the following simple way: that in these cases there is no feeling of using any sense organ at all. The most vivid examples of this are proprioception and the senses of balance. [...] with the sense of balance; you don’t need visual, tactile, or any other cues to know which way the ground is. But there is no part of the body that we’re aware of using to find that information out. If my account is correct, it makes sense that these were never counted as sixth or seventh senses.

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25This should not be taken to imply that relaxing, or reducing the effects of gravity by immersion in a flotation tank, will quickly lead to disorientation. The connections between attention, habit, action and stimulus are complex. Orientation, as well as proprioceptive knowledge of the extent and position of bodily parts, are in some ways remarkably robust but at the same time surprisingly fragile.
26O’Dea (2010), emphasis original.
It is always debatable just how much we are aware of, but by paying attention to what Reid said about our sense of balance we can see what is wrong here. It is closer to the truth to say that with the sense of balance, it is every part of the body that we are aware of using to remain upright and keep oriented with respect to the vertical and our goal. Paying concentrated attention to the relevant sensations is quite another matter, but we find out which is the downward direction, and are constantly reminded of it, from the downward pull on our body and the efforts we need to make to resist falling to the ground.

O’Dea’s account can be seen to be mistaken in that it manages to complicate the simplicity of the traditional count by insisting that the evident differences between the iconic sensations are not enough, or even need to be ignored, and then importing other, largely irrelevant sensations into the problem. A direct way of getting free of these errors is to give up on the self-defeating dogma that qualitative differences between sensations have no role to play in individuation and re-examine our concrete experience of sensations. The sense of balance provides an excellent test case since the multimodal nature of all our sensations is clear in it. To recognise this, it is first necessary to clarify the role of the vestibular apparatus in not only the sense of balance but in all perception. What follows is that all the traditional senses are multimodal, all our experience is multisensory, and all concrete sensations are complex.

### 4.1.3 The Foundations of Perception

It might seem that the discussion of balance thus far has focussed too narrowly on vestibular functioning. If the psychological literature on posture and balance is examined, then it is clear that apart from a vestibular judgement of the vertical, our vision also provides a reference, and the two can even come into conflict. It is also well-known that pilots should not fly ‘by the seat of their pants’: if they neglect instrumental indicators and also lose visual reference by flying through clouds, they are liable to crash. Perhaps the vestibular apparatus is not essential after all.

Two clues to what is important, both mentioned by Reid, are relevant. We should not be considering abstractions such as extension and depth, or just one direction, or a horizon alone; we should relate our performance to the Laws of Motion. As Reid understood these, this is Newtonian dynamics in which vector forces are taken to be real and the composition of forces determines how one should direct effort in moving and turning, and so on. We should
4.1. THE PRECONDITIONS OF AGENCY

also consider how balance develops, and how our directed actions allow us to acquire habits of perception.

To fully appreciate the role of balance in perceiving, we must now determine the preconditions for actual purposive movement characteristic of an agent. Whether this be a response to a specific stimulus or the enacting of an imagined scenario, this motion is a from-to movement accomplished by an effort, and not just a kind of passive drift or a senseless flailing about. The fundamental starting point here is not knowledge of space as an abstract room to move, but perspective and orientation with a knowledge of direction and acceleration.

It is essential to recognise that without direction and orientation we not only cannot move as we will, we also cannot see objects in space, since the precondition for seeing something is to look at it and keep still, or at least distinguish the motion of the object from the motion of the observer, as Wells pointed out.27 This is the basis for identifying persistent individual objects rather than merely facing a confused play of colour. The perceiver can eventually acquire habits of seeing so that vision can compensate some acquired deficiencies of balance, but vestibular functioning is the key ingredient for developing spatially informative seeing, just as it is for goal directed movement. In linking balance closely to voluntary motions, Reid is effectively granting the agent an ineliminable role in not just moving, but in perceiving.

To put this a bit more provocatively, perhaps one can say that balance is inseparable from physical agency and a precondition for perceptual learning. If vestibular function has an important role in this, then this set of organs must be in place before the development of perceptual habits can begin, and vestibular information on the spatiotemporal structure and dynamic response of the physical world is then integrated into all these habits. These habits include what we ordinarily call seeing and hearing. These large claims need defending in some detail. For now, they can be illustrated by some of the recent research into vestibular functioning.

Firstly, all moving organisms which have something invested in going in a particular direction have some organ for determining the downward direction. These organs are some of the most ancient in evolutionary terms.28 For an organism which is extended and has proprioceptive knowledge of bodily posi-

27 Seeing clearly demands not only positioning the body, but also developing skills to compensate for its motions by appropriate eye movements. These skills can even take on the character of reflexes, although they are acquired and plastic. See Benson (1982).

tion, only one direction has to be fixed in relation to the environment for the organism to fix its own frame of reference and measure, or compare, positions and movements of objects. It is difficult to see how this might develop without a universal direction and a means of fixing it.

Secondly, as a recent review of vestibular functioning puts it:

Unlike other senses, vestibular information in the central nervous system becomes immediately multisensory and multimodal. There is no overt, readily recognizable conscious sensation from these organs, yet vestibular signals contribute to a surprising range of brain functions, from the most automatic reflexes to spatial perception and motor coordination.\(^{29}\)

Thirdly, as Daphne and Charles Maurer explain in their book on the cognitive development of infants:

Of all the sensory systems, the vestibular system is the first to mature. The organs of balance in the inner ear are mature in shape and are partially innervated before eight weeks of gestation. By six months of gestation they are not only mature in shape, they are also mature in size and are completely innervated—the only organs in the body to become adult during gestation.\(^{30}\)

This early development, by the way, is the reason why newborns can already have spatial competencies—they acquired them in the womb. Fourthly, in specific comments on the sensations experienced by newborns, the Maurers note that:

Adults’ sensations rarely spill from one sensory system into another, as the newborn’s do. But a signal exception to this lies with our sensations of balance and sight, which work together so closely that if we close our eyes and pirouette, after opening them again, the world looks as if it is moving. In contrast, the newborn’s sensations spill about throughout his brain from one system to another, because his brain lacks the adult’s deep network of neural channels; and one set of these channels that is not mature is the set that links the vestibular and visual systems. So the one place where adults are signally synesthetic, the newborn baby is not.\(^{31}\)

\(^{29}\)Angelaki and Cullen (2008, p. 125).
\(^{30}\)Maurer and Maurer (1988, p. 161).
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What the baby is doing in perceptual learning is integrating vestibular and bodily information with external stimulation by light and sound. So, far from separating itself from the environment, it is placing its body and integrating its sensory organs into the dynamic world. Fifthly and lastly, Patrick Wall has something fascinating to tell about balance in his book on pain. In talking about people who have suffered a stroke which has destroyed their inferior parietal cortex, he tells us that:

If the stroke has occurred on the right side of the brain, these people appear completely unaware of anything on the left side of their world. They appear blind and deaf to anything occurring on the left and, most bizarre of all, when shown their own left hand they deny that it is part of them. [...] Now comes the really astounding fact. Italian doctors, whose results were confirmed by many others, discovered that stimulation of the vestibular system in the ear completely restored all sensation on the left side. It disappeared again as soon as the stimulation stopped.\textsuperscript{32}

There is no perception of spatial relations in the world without the enabling role of the vestibular system in our sense of balance. It would seem there is no perception at all.

4.2 The Complexity of Balance

One of the difficulties in making clear distinctions when considering the senses and the information obtained in using them is that hard divisions are rare in the organic world. Further, what cannot be achieved in one way can still be done in another. The question may be asked whether the vestibular apparatus, despite everything already said about its importance, is essential in perceptual activity. Answering it helps us to understand both what is truly essential and the role which the vestibular functioning normally plays in experience.

Reid and Wells worked far too early to have known the various functions of the vestibular apparatus. Nowadays, everyone who discusses orientation and balance must be aware of its importance, but when we consider what Reid wrote he was evidently talking about a multisensory modality in what he called the sense of balance. Putting this negatively, he still had it mixed

\textsuperscript{32}Wall (2000, pp. 148–149).
up with the muscle sense. Putting it more positively, he was considering an endowment in which both proprioception and vestibular functioning play a role. The sensations which he was talking about were thus what may be called compound or complex sensations, which arise in the co-operative working of different sets of organs.

Neither Reid nor Wells were actually talking about the vestibular system. Wells in his experiments comes closer to investigating the rather direct link between eyesight and vestibular stimulation, but Reid was really talking about actively maintained bodily balance. Now there is at least one way in which it is right to say that we do not do anything with the vestibular organs when we collect the information needed to balance. The actual organs are beyond voluntary control. The same can be said of the olfactory receptors and even the ears. When we sniff or cock our head to hear, we are not really moving the organ but merely orienting it or stimulating it indirectly.

This has important implications for placing the vestibular apparatus correctly into the sense of balance. Vestibular signals are not enough if what one wants to achieve is balance, or if they wish to educate their eyes and ears about spatial relations and relative motions. To do any of that we actually have to use our muscles and exert effort. Fully functioning vestibular organs are not even essential for balance and once we achieve the upright posture vestibular information plays no part in maintaining it. It may then well be asked what its main role is in the sense of balance and in perceiving.

The general answer is that the sense of balance involves vestibular, proprioceptive and tactile systems. The extent to which all these systems contribute, and how malfunctions are compensated, raises empirical rather than philosophical questions. It can be readily seen, for example, that in some cases of vestibular dysfunction the weight of body parts felt proprioceptively can provide a surrogate downward reference.

What makes the vestibular organs special is that they provide that ‘secret reference’ directly to the head senses which we use to see and hear with. These are our most important senses for the detection of remote objects, and the positioning of and control over the motions of the head are needed to begin perceptual learning with these head senses.

\[\text{Howard and Templeton (1966, p. 255).}\]

\[\text{Even if the vestibular sense is not essential in maintaining the normal stance, it becomes more important for keeping the head still and oriented while running. There is good reason to believe that this has until recently had significant survival value, see McCredie (2007, pp. 107–115). Large and sensitive vestibular organs are essential for agility and they facilitate}\]
But given all this it is nevertheless wrong to call the vestibular system a sense of balance, for the simple reason that balance requires two participants. The best that the vestibular sense can do is to provide some of the information needed in this interaction, and the value of Reid’s insight lies precisely in his placing the perceiver in the centre of the action of balancing.

The perceiver who has achieved balance is working from a perspective, is oriented, and exerts an effort in the appropriate direction to reach a goal. This effort does not necessarily mean motion—it is just as truly present in looking in a particular direction as in pointing there or going there. To the extent that they understand their own effectiveness and power, and see their action as the contributing cause of the end result, perceivers conceive their voluntary motion as determined by their purpose, and their agency as decisive of the outcome. The act is informed throughout its performance by bodily sensations signalling the effort being made. That our apprehension of our own effectiveness is the template for our understanding of causal links is something that Reid thinks likely:

Whether the conception of efficient cause, and of real activity, could ever have entered into the mind of man, if we had not had the experience of activity in ourselves, I am not able to determine with certainty. […] If it be so that the conception of an efficient cause enters into the mind, only from the early conviction we have that we are the efficients of our own voluntary actions, (which I think is most probable,) the notion of efficiency will be reduced to this, that it is a relation between the cause and the effect, similar to that which is between us and our voluntary actions. This is surely the most distinct notion, and, I think, the only notion we can form of real efficiency.

It is easy enough to acknowledge that our waking life is one of unceasing voluntary motion and effort, even if habits and skills allow us to neglect deliberating on the activity and to attend instead to its objects. It is perhaps less easy to see that it is by way of these efforts, and the understanding of dynamics implicit in them, that we come to perceive anything as enduring, extended skilled jumping and turning, not to mention accurate throwing. On the other hand, impaired vestibular functioning can be more easily compensated in humans than in other species, see Geldard (1972, pp. 426-427).

and located, moving or still. In making any of these judgements it is our body and the perspective achieved in balancing it which provide the framework for comparison. As already explained on page 111, location is inconceivable without relation to either self or a shared and agreed object. The same is evident for motion confined to simple translations. In considering the full spectrum of dynamical variables known directly through our own activity—force, inertia, friction, acceleration, velocity, distance and duration—it can be seen that all the primary qualities of bodies belong also to our own body, and are known directly through the awareness of our own activity. It is important to notice this: moving the parts of our body is more a question of effort and acceleration than it is of translation, and the physics of those movements feels more Aristotelian than Newtonian. Constant effort, rather than constant motion or passive stillness, typifies this activity.

4.2.1 Sensory Multimodality

In considering what the vestibular apparatus can do for us it would seem that the information it provides to the central nervous system is abstract. What would a bare feeling of ‘down’ actually be? We do not perceive direction but always something that is located in that direction, or perhaps a pull in that direction. Whereas the iconic sensations seem to have their own inherent qualities, the abstract nature of the information provided by the vestibular organs is often glossed by saying that these organs yield no sensations.

Frank Geldard puts it this way:

The “labyrinthine sense,” as it is sometimes called, yields no sensations! That is, it yields none directly in the same way that vision, audition, and the other senses do. It appears to have no “qualities” of its own.\textsuperscript{36}

Angelaki and Cullen say that “there is no overt, readily recognizable conscious sensation from these organs”\textsuperscript{37} and von Buddenbrock claims that “scientists are handicapped in the investigation of these sense organs by the fact that the excitation of the organ does not produce any sensation, but expresses itself in involuntary movements”.\textsuperscript{38}

\textsuperscript{36}Geldard (1972, p. 401).
\textsuperscript{37}Angelaki and Cullen (2008, p. 125).
\textsuperscript{38}von Buddenbrock (1958, p. 137).
4.2. THE COMPLEXITY OF BALANCE

Now a sense without sensations would seem to have no place in Reid’s epistemology, and it needs to be asked what such a sense does for us if it does not somehow contribute to our subjective experience. As it happens, it is not difficult to see what a set of organs which transduce the direction of gravity and angular accelerations around the three orthogonal directions of space can do. As already explained, they can provide direction and perspective. They do so by breaking the symmetry of purely relative spatial relations in fixing a dynamical ‘downward’, as well as the directed rotations around the up-down, front-back, and left-right axes of the head. Hence they can give us a reference frame and even what might be called, in the context of dynamics, an ‘absolute here’.

Directionality and place is thus potentially available for all sensations if this information is integrated with other sensations and feelings, giving them not just their relative ‘thereness’, but fixing the human frame with respect to the frame of reference of the Earth with its universally shared up and down. This makes it possible to gauge the locations and the relative motions of not just body parts but also external objects.

Looking at the matter in this way presupposes that we give up on a simple matching of organs and sensations. Although it remains possible to retain a schematic association of colour with eye, sound with ear, and so on for the other iconic sensations, when our bodily balance is considered there is no reason why the information from the vestibular system cannot be integrated into our bodily feelings in such a way that strains and efforts feel immediately directed, and any turn of the body is felt in relation to a stable centre. Approached in this way, Reid’s sense of balance relies on multiple sets of organs. In addition to the vestibular organs, it integrates information from proprioceptive receptors in the muscles and joints, as well as cutaneous pressure receptors. There is also no reason why some of the other senses cannot contribute to bodily balance, as indeed they must if vestibular functioning is compromised.39

The idea can be extended a little further by reconsidering touch, and Aristotle’s remark that we only feel that which is harder or softer than we are.

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39An exhaustive treatment of the various contributions to posture and orientation is given by Howard and Templeton (1966). Geldard also makes valuable remarks, especially on the difference between humans and other species, see Geldard (1972, ch. 14). It is likely that the deep plasticity of the human brain plays a role in the compensation for loss of vestibular function. It should be noted that some of those born deaf have grossly impaired vestibular functioning from birth, and although they experience learning difficulties, they can largely overcome their handicaps in posture and locomotion.
To make any sense of sensations of hardness we need to acknowledge that all touching relies on the exertion of pressure, and it is this that complicates matters for our judgements. Although a light touch might be confined to skin sensations, any significant pressure applies a force which evokes a reaction, and this involves not only the skin but the whole bodily balance.\textsuperscript{40} The deliberate but moderate touching discussed in connection with hardness is needed for the perceiver to apprehend the object as something other, as something offering resistance and opposing the active touch.

Touch and balance are therefore not easily separated, and our judgement of the position of body parts and of bodily extent should be expected to involve balance and voluntary exertions. This is confirmed by James Lackner and Paul DiZio who write that:

Proprioceptive information about limb configuration combined with somatosensory information about hand or limb contact with the body itself and with external objects is a key factor in calibration of the apparent dimensions of the body and of its relationship to external space. For example, if a subject is grasping his nose with his fingers and the biceps brachii muscle of the arm is vibrated, an illusion of arm extension will be elicited and the subject may feel his nose elongate in Pinocchio fashion.\textsuperscript{41}

In considering all our multimodal achievements, the chief error to be resisted is the notion that we can freely abstract from the full complexity of dynamics and deal with spatial relations, temporal relations and motions as if they were separable. The full answer to questions regarding the perception of extension and form, or of time, or any other dynamical variable will always need to deal with the participation of the perceiver in a dynamic world.

The idea that the primary qualities of bodies would be known to us in sensation does not fit comfortably into Reid’s basic epistemological scheme, and in the \textit{Inquiry} he resisted it. Sensations to him did not resemble in any way what they indicate, so in the case of balance for example, our knowledge of the downward direction has to be separable from the sensations we feel. He thus strove to keep our knowledge of primary qualities and our bodily sensations apart. This striving led him into errors. Since these errors help

\textsuperscript{40}The rich spectrum of skin sensations and their connections are discussed by Geldard (1972, ch. 9).

\textsuperscript{41}Lackner and DiZio (2005, p. 126).
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in clarifying our experience of concrete sensations, it is instructive to consider them, and the best place to start is with Reid’s comments on the perception of extension and form.

4.2.2 The Mystery of Extension and Form

Having set up an epistemological scheme with the division between primary and secondary qualities at its core obliges Reid to give some account of how the sensations acting as signs relate to their meanings. In adapting Berkeley’s example of hearing the sound of a passing coach, he clearly allows us to imagine that a sensation can signify a physical object, but more often than not, a sensation signifies merely a property or quality of an object. Having asserted that when we perceive primary qualities these belong to the object just as they are perceived, he is naturally obliged to insist that we do not somehow deduce or infer primary qualities from our sensations (Locke’s ideas of sense) because that would eventually lead to the absurdities embraced by some of Locke’s followers. According to Reid we not only comprehend the meanings of natural signs directly, we do not even need to learn how to ‘read’ them!

Unfortunately such a stark division in the objects of experience generates problems. Some of these can best be illustrated by examining extension and form. The issue of how we acquire notions of extension, figure and motion is of paramount importance to Reid:

The conception of extension, motion, and the other attributes of matter, cannot be the effect of error or prejudice; it must be the work of nature. And the power or faculty, by which we acquire those conceptions, must be something different from any power of the human mind that hath been explained, since it is neither sensation nor reflection.

This I would therefore humbly propose as an \textit{experimentum crucis}, by which the ideal system must stand or fall; and it brings the matter to a short issue: Extension, figure, motion, may, any one, or all of them, be taken for the subject of this experiment. Either they are ideas of sensation, or they are not. If any one of them can be shown to be an idea of sensation, or to have the least resemblance to any sensation, I lay my hand upon my mouth, and give up all
pretence to reconcile reason to common sense in this matter, and must suffer the ideal scepticism to triumph.\textsuperscript{42}

Reid is loath to admit that our notions of space and location are obtained from our sensations, but what is meant here by ‘idea of sensation’? These ideas of sensation are styled as pure experiences of a quality (a direct apprehension of colour, or the immediate enjoyment of a perfume, etc.) which act merely as signs that we interpret—either by nature or by acquired means—to perceive real objects. The problem is that only an exceptional anoesis could be an experience of the required kind and it cannot, of itself, lead anywhere—as Reid correctly notes. ‘Sensations’, understood in the sense that Reid requires, are theoretical constructs. They cannot be experienced. All our sensations are connected meaningfully to others and while an analysis of the totality of experience can separate and identify individual, specific sensations, it cannot divorce them from their place in the whole.

As we have already noted, sensations of bodily motion and effort, and the sense of balance, were noticed and discussed by Reid late in his life. It is these that provide the key to the whole puzzle, as can be seen by considering a thought experiment used in the \textit{Inquiry} to try and show that our notions of extension and figure are not derived from our sensations. Reid asks us to

\begin{quote}

suppose a blind man, by some strange distemper, to have lost all the experience and habits and notions he had got by touch; not to have the least conception of the existence, figure, dimensions, or extension, either of his own body, or of any other; but to have all his knowledge of external things to acquire anew, by means of sensation, and the power of reason, which we suppose to remain entire.

We shall, first, suppose his body fixed immovably in one place, and that he can only have the feelings of touch, by the application of other bodies to it. Suppose him first to be pricked with a pin; this will, no doubt, give a smart sensation: he feels pain; but what can he infer from it? Nothing surely with regard to the existence or
\end{quote}

\textsuperscript{42}Reid (2000, p. 70), emphasis original. It is instructive to ask here which ‘ideas of sensation’ allow me to “lay my hand upon my mouth”. We saw on page 25 above that none of the traditional five senses is needed for us to do it. The only sensation available from the traditional senses considered by Reid in the \textit{Inquiry} is the touch which arrives once the whole action is complete.
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figure of a pin. He can infer nothing from this species of pain, which he may not as well infer from the gout or sciatica. […] Having had formerly no notion of body or of extension, the prick of a pin can give him none.43

If this man really was pricked by a pin, he assuredly would not immediately gain a conception of the figure of a pin, as Reid insists, but would he not inevitably sense where he was pricked? It would need strong argument to show that a pain in the thumb is (to this poor wretch suffering our experiment) indistinguishable from a pain in the nose and indeed, that being pricked in two different places is not as meaningful to him as being pricked at two different times. He would surely not confuse two pricks as being one, either temporally or spatially, unless his bodily senses were also made inoperative, or his neural connections disastrously disfigured. Assuming that his organs (apart from those disabled by Reid) are working, two pricks are always felt as qualitatively different.44

So “having had formerly no notion of body or of extension, the prick of a pin can give him none” is false since he necessarily has a physical body, and the sense of touch or the pain of a prick is exactly how he becomes aware of it and gets a “notion of body or extension”. Of course if “notion” refers to an abstract theoretical understanding, then it may take some time to develop that from a series of immediate sensations, but those sensations are all localised. Although there is a bit of truth in saying that “he can infer nothing from this species of pain [the prick], which he may not as well infer from the gout or sciatica”, he can already infer from these discomforts where they are located and obtain a notion of extension from that. His own body is extended.

The strain required to keep ignoring the role of our own extended body becomes palpable when Reid hints that if we have no absolute measure of the size of our own body, we cannot judge how big an object is:

When my two hands touch the extremities of a body; if I know them to be a foot asunder, I easily collect that the body is a foot long; […] but if I know not what the distance of my hands is, I cannot know the length of the object they grasp.45

43Reid (2000, p. 65).
44The fact that the stimuli have to be separated by some distance in order to be felt as distinct is not relevant here.
45Reid (2000, p. 66).
The second conditional is trivially true, but it does not follow that any ‘external authority’ is needed to judge the distance between my hands, and to know that it is greater when my arms are outstretched than it is when I bring my hands together. All this is known primarily through the body, and the fact that the name of the measuring unit Reid uses is a ‘foot’ has not struck him in its full significance.

It is important to note that by attacking Reid’s argument here I am not defending any version of representationalism, or sensationalism, or telling a story which would explain learning. The main point is that sensations as they are experienced are inherently rich in meaning, and abstract notions of space and time can indeed be acquired by attending to them thoughtfully, provided that we take into account our bodily senses and the sensations belonging to them. It is not necessary, on this view, to posit any a priori mode of knowing for spatial relations. Sensations should be recognised as the richest and the most complex phenomena of experience, not the simplest and most primitive.

Having said all that, we must still admit that if Reid really thought it as important as he says it is, his experimentum crucis is unlikely to be so easily dismissed. Indeed it has an interesting history, and it has recently generated considerable debate.\textsuperscript{46} The first important point to notice is that as it is presented in the Inquiry, the scenario is extremely restrictive, giving the blind man very little opportunity to learn anything from his sensations. In particular, it is unreasonable to ask him to acquire a notion of the shape of a pin without allowing him to explore it by active touching. We judge shapes of objects not by simply poking them (or being poked by them) but by stroking, pushing, grasping, squeezing, etc. Only by sliding a finger along the length and feeling the sharp point could anyone come to understand, by touch alone, that a pin is thin, straight and sharp at one end.

Ryan Nichols offers a similar line of criticism:

The subject in Reid’s rapid-fire crucial test is not portrayed as exemplifying the patience that a human being may need to acquire concepts. While Reid does allow the subject the use of “the power of reason”, Reid takes no pains to describe the role that reflection might play in the process. Instead Reid inadvertently trivializes the role of reflection by feeding the subject one sensation at a time, thereby leaving him very little to reflect upon. An agent like the

\textsuperscript{46}See Nichols (2007), DeRose (1989), and particularly Buras (2010).
subject who is deprived of his sensations would need a panoply of sensation experience, and the time to bring coherence to it, if he is to have any hope of achieving an intentional perceptual awareness of primary qualities. This may require the agent to move his body, to understand how certain sensations follow upon others, and how his body is capable of creating sensations.\textsuperscript{47}

The second point to notice is that Condillac, “apparently unbeknownst to Reid”,\textsuperscript{48} devised a similar thought experiment—this time of a statue coming to life as she is gradually endowed with sensations—and reached a conclusion contrary to Reid’s.\textsuperscript{49} We clearly need to ask what is different in the experience of sensations between Condillac and Reid, the difference that leads to this divergence. Part of the answer is provided by the existence of a fuller and less restrictive version of the \textit{experimentum} described in Reid’s manuscripts. In this fuller version Reid allows the blind man to touch his own nose and to explore the features of his face. He still denies that the man would get \textit{our} direct notion of extension, but allows that he may get some complex notion of the topography of his face.\textsuperscript{50} Could such a notion not be enough for our knowledge of what we call primary qualities?

This can be answered by way of a third and last point, argued by Todd Buras recently. It is unlikely that any sensation-based apprehension of extension and the other primary qualities would have satisfied Reid. Buras explains that the main reason for this is Reid’s insistence that we must know these qualities as they are, and not through any relation that we or they may enter into. A notion of extension must not be “a relative notion”, and to Reid “it is evident, that our notion of primary qualities is not of this kind; we know what they are, and not barely what relation they bear to something else”.\textsuperscript{51} This insistence arises from the fact that Reid’s quarrel with the sceptic takes precedence over efforts to supply a naturalised account of how exploratory activity of the world of experience informs the perceiver.\textsuperscript{52} Reid allows that “there are many objects of thought, and of discourse, of which our faculties can give no

\textsuperscript{47}Nichols (2007, p. 95). The embedded quotation is from Reid (2000, p. 65).
\textsuperscript{48}Buras (2010).
\textsuperscript{49}Condillac’s version is discussed by Falkenstein (2005). Extension, in the guise of localisation of sensations, has a crucial role to play. See Falkenstein (2000).
\textsuperscript{50}See Buras (2010), DeRose (1989) and Nichols (2007) for details.
\textsuperscript{52}Cf. Falkenstein (2000).
better than a relative notion”. In the extended version of the *experimentum* he even goes part way to agree with Condillac, that relative extension can be apprehended from a complex flow of sensations:

Suppose then I say that I learn the distance of my head & feet, by moving my hand from one to the other. The velocity of this motion & the time give me a perception of the distance between them. And I acknowledge I can find no better account of the matter.

The only problem with such relative notions seems to be, then, that they fail to satisfy the requirements of Reid’s epistemological scheme, which is formulated to overcome the sceptical possibilities in the Way of Ideas. Now accepting advice from Boyle in refusing to consider anything at all as ‘barely in itself’, and taking the next step in always making do with relations, is not the same as giving up on arguments against the sceptic. But if knowledge of relations is enough for us to operate as effective agents in the world, then other requirements regarding inherent properties brought in specifically to answer various sceptics, as good as they may be for that purpose, are additional to an adequate understanding of the natural process of perceiving.

### 4.3 Individual Sensations

Claims of the importance of embodiment and of sensorimotor skills in perceiving no longer need the supporting arguments that may have been called for in

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54From Reid’s extended version of the *experimentum*, quoted in Nichols (2007, p. 102). Reid raises additional problems related to remembering which Nichols considers, but these problems can be addressed by refusing to characterise sensations as separate and disconnected elements of experience. The dynamical variables such as duration, extension, force, etc. can certainly be treated mathematically as pure quantities, but they do not enter experience separately. They are *abstracted* from it, and to insist that they are ever given separately is to argue theory against fact.

55It is instructive to consider, as we have done, the status of effort and direction. There is no more direct way to apprehend these than by balancing. We *identify* with one of the active sides in this dynamic equilibrium, and putting something between our being and what we apprehend as our own activity opens the door to the most radical scepticism regarding the self—for Reid’s ridicule of Hume on this, see Reid (2000, ch. II, sect. VI). But this directness does not exclude relations since our action necessarily vanishes if the opposing force is removed. The relational nature of participatory, physical interactions is enshrined in Newton’s third law. On Reid’s belief that our notions of effort and cause are relative to our own effectiveness, see page 139 above.
Reid’s day. Perceiving styled as an activity of the subject is a commonplace of empirical psychology, and although there may still be some controversy in how this plays out in philosophical accounts of perception, it is now becoming more difficult to present passive accounts of perception without supporting arguments or qualifications.

Reid’s account is thus out of date and today it hardly needs repeating that bodily activity and experience play a key role in every act of perception. There is, however, a good reason to return to Reid and his *experimentum crucis*, since the mistake in it is easy to spot and crucially important. It has already been pointed out: the error is thinking that sensations are in any workable sense simple and separate. Characterised as such they are, as Whitehead called them, abstractions.\(^56\)

Being able to list individual colours or tastes is book knowledge which tells us almost nothing about the appearance of flowers in a forest, or a sunset on the beach, or the flavours of the meal which we may have enjoyed earlier. And the predicates we use in talking philosophically about sensations—calling them private or subjective or secondary or simple, for example—tells us mainly about our efforts to discriminate among phenomena and re-describe them in theoretical pictures.

Ordinary names and qualifiers used to denote sensations and related occurrences within lived experience indicate rather than describe, or perhaps describe only through more and more specific indications. There is no description or explanation of ‘red’ or ‘warm’ which would communicate this experience to someone who has not seen red or felt warm, and volumes could be written about the richness and complexity of the sound of a coach without obviating the necessity of actually hearing it before it can serve as a sign for the real thing. Indeed, the complexity and subtle structure in ostensibly simple sounds, such as ‘a’ or ‘o’ and the other vowels, has kept researchers attempting to synthesise the human voice busy for decades.

The pain of a pinprick is always located and of some duration and intensity, at least if it is to be perceived by an attentive human subject. For a normal self-aware perceiver, a sharp sensation such as this could easily monopolise the attention for a moment, but it must take its place in a tide of myriad other sensations, feelings, emotions, efforts and thoughts. The sharp stab is itself not isolated from the rest of experience and indeed, to the extent that it can be isolated, it becomes difficult to sense and it may not even be identified

\(^{56}\)Whitehead (1959, p. 25).
as a species of pain. Reid’s experiment is contrived within the context of an underlying view of sensations as simple elements of experience. There are no such elements given to the perceiver and they have to be achieved in a process which requires activity. This is not only, or perhaps not even significantly, an individual activity, but before the individual’s role in the structuring of experience is noted an illustration of how the senses work together in daily life may be useful.

Any of the senses could be chosen, with touching an especially rich source of examples of how the whole suite of sensory skills plays out in routine acts of recognition and enjoyment, but for the sake of variety taste will serve us as well here.

What does one mean when they say that, just now, they will taste the tea? An analysis of this in terms of salty, sour, sweet and bitter is grossly inadequate. A description of what can be expected in terms of warm, moist, the mouth feel of the liquor, the flowery bouquet and hint of spice, the translucent amber colour; this gets much closer to the mark. These terms certainly can include some involving the four cardinal points of taste, but those sink into insignificance next to the aromas, sights, tactile sensations of heat and moistness, and the comforting appropriateness of the efforts required to sip and swallow the tea. Everything has to be just right, and if someone iced the liquid, offered it in an inappropriate container and disguised its colour, most of us would have no idea what we were drinking.57

But perhaps our tastes have been vitiated and “rendered less fit to perform their natural offices, by the unnatural kind of life men commonly lead in society”,58 and it would be better to ask how infants react to taste. On

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57 As Jennifer Ackerman puts it in discussing these cross-modal interactions: “What you see changes what you taste” and also affects “what you hear and feel”; Ackerman (2007, p. 25), and references therein. Perceptions of flavour also depend on expectations, and can be affected by suggestion, see O’Mahony and Thompson (1977).

58 Reid (2000, p. 46). It is interesting to note that while sugar and salt have been valued in history, the most important trade goods—and indeed the spur to European exploration and colonisation efforts—are pungent substances which cause irritation and pain (pepper, chilli, ginger and other spices), and bitter substances which are pleasurably associated with caffeine induced wakefulness (coffee and tea). See Mair and Hoh (2009) on the trade value of tea. In the light of this, it is evidently a mistake to insist that there are only four tastes (or to add umami as a fifth). Perhaps a more natural doctrine is the old Chinese wisdom: “the liver prefers acid taste, the lungs pungent, the spleen sweet, the kidney salty and the heart bitter”; Mair and Hoh (2009, p. 86). Recent scientific findings indicate that discrimination of tastes and the physiological functioning of this sense may be far more complex than four localised taste receptors would suggest. See, for example, Cicerale et al. (2009).
the one hand, it is well-known that small children are not fussy, happily sampling dirt and plastic toys and anything else within reach. On the other hand, they are stern judges of food, being interested in foodstuffs only at the right temperature, preferably sweet or neutral, and as they grow their main early enjoyment in eating has much to do with texture and appearance. The strong ‘elemental’ tastes are not, at least to begin with, of any intrinsic interest and both sour and bitter are reflexively repulsive. As natural language suggests, taste is acquired and discrimination in matters of taste is a refinement.\(^{59}\)

We have also already seen that discrimination within a fluid world of mixed sensory confusion is the basic activity for the infant since it is naturally synesthetic. Not surprisingly, infants seek both novelty and repetition, and their main activity is mimicry of the humans around them. They are, to a large extent, at the mercy of these humans to show them how to move to feel ‘normal’, and which objects they should notice and value. The precondition for all of this activity is the possibility of agency expressed in directed movement and, in this sense at least, the primacy of balance is perfectly intelligible. However, while balance with its intimate connections to agency and the fundamental variables of dynamics must be admitted as a precondition for other active discriminations, there is no reason to think that our knowledge of all these ‘primary qualities’ is any different to any other sensory knowledge. Spatial relations and geometrical necessities are \textit{a priori} only if we awkwardly maintain that they are ‘purely conceptual’, and thus learnable only indirectly, by reading marks on paper or interpreting other arbitrary symbols standing in for this unearthly knowledge. Examining how we come to perceive them shows that ‘primary qualities’ are as relational as the feel of hot water on a cold hand.

All this would be only of peripheral importance in epistemology were it not for the ubiquity of the prejudice that sensory experience is somehow innately separated into channels, and that these channels provide bits of information which the perceiver collects and collates to assemble objects, situations and experiences. Since those of us who are fortunate to have them all use all our senses in concert and fail at fairly routine perceptual tasks whenever prevented from doing so, it would seem that we know these objects and situations far better than the supposedly elemental sensations and feelings which are assumed to be known directly. It would at least suggest that any account which starts explaining sensory experience on the basis of simple, individual sensations has the story upside down.

\(^{59}\text{Cf. Rivlin and Gravelle (1984, p. 75).}\)
There is no denying that there is some value in studying eyes separately from ears or the olfactory organs separately from the various thermoreceptors. What is of more direct concern is not whether highly discriminated sensory experience (i.e. individual sensations) cannot be achieved and recognised and exploited, but how such sensations are described and evaluated in an epistemological context.

4.4 Summary

The counting problem is intimately related to the problem of individuation; the senses cannot be counted until they are distinguished or separated from each other. Individuation is normally based on the differences among the iconic sensations—sounds, odours, tastes, touches and colours—and their association with the outwardly oriented sensory organs in the head or, in the case of touch, the skin. The question why other readily acknowledged sensations, such as warmth and pain, do not swell the count of the senses points to the importance of a naive separation of the perceiver from the objects of perception.

If the findings of modern science on the physiology and psychology of sensory systems are to be incorporated into a critical count of the senses, the simple separation of the perceiver from the world must be reconsidered. This is approached indirectly by first considering the bodily senses and the activity of the perceiver. This approach is useful in that the dynamical variables (duration, extension and location, motion and acceleration) are immediately restored to their central role in our experience of the world, which is not a world of passively known experiential episodes, but one of persisting, located and moving individuals interacting dynamically. The examination of the relevant variables, which are closely related to the primary qualities and to the common sensibles of Aristotelian doctrines, shows how the activity of the perceiver reveals the world in dynamical interactions.

Because the perceiver must be active to participate in dynamical relations, the preconditions for purposeful activity require consideration at the outset. These preconditions are the ability of the perceiver to orient their body in space and to direct their effort. Establishing a reference frame and an orientation is achieved in balancing the body against environmental influences, and in humans the sense of balance and the vestibular apparatus which serves it are instrumental in the agent’s ability to act. Achieving balance is not merely a matter of collecting vestibular information, but relies on moving the body and continuously correcting posture and attitude.
4.4. SUMMARY

The sense of balance is considered in some detail by drawing on comments made by Reid and his contemporary Wells. Both drew attention to the importance of orientation with respect to gravity and our knowledge of a stable vertical reference when moving. Since the sensations associated with balance are bodily, and fuse information from several sensory systems, they do not fit a simple picture which matches an organ or set of related organs to a spectrum or continuum of just one type of sensation. This simple picture may be tempting when matching ears to hearing sounds, and analogously associating the iconic sensations with each of the traditional senses.

Not only does this simplicity vanish for balance, since balancing involves vestibular, proprioceptive and tactile systems which also play a role in other sensory modalities, considering balance shows that this sense cuts across all the important distinctions of the naive tradition. Balancing is not easily separated from touching or any of the other sensory modalities. This can already be surmised from noticing that the concrete experience of even the iconic sensation normally locates them in space and thus presupposes orientation. Balance also frustrates efforts to separate the perceiver from the world, since the perceiver in balance is evidently an active participant in it. Furthermore, while the sensations associated with balance are muscular and bodily feelings of effort and intent, and in that way informative of the state of the perceiver just as pains or emotions are, they are at the same time inseparable from our knowledge of the primary qualities such as extension.

The importance of vestibular information and its seamless integration into our sensory experience suggests that all our sensations are multimodal and arise in the co-operation of diverse sets of organs. Not only are the iconic sensations multimodal in concrete experience, our success in recognising objects, foodstuffs or situations depends on a multiplicity of senses.

Since our knowledge of spatial relations and of motion is acquired in the sensory interactions facilitated by balance, knowledge of primary qualities and all dynamical variables arises naturally within subjective experience. It is not separate from our enjoyment of sensations, unless what is meant by a sensation is something removed from concrete experience and rendered elemental by fiat—fashioned into what we have been calling ‘iconic sensations’. The characterisation of sensations as inseparable from dynamical properties, which relies on seeing sensations as complex and rich episodes of experience, is in conflict with Reid’s opinions on the need to separate primary from secondary qualities, and subjective sensations from the corresponding occult qualities of bodies.
The errors which Reid is led into as a consequence of trying to keep sensations and primary qualities separate are instructive since they involve substantive claims about how knowledge of primary qualities is acquired. Judging from some comments in the *Inquiry*, Reid understands the development of perceptual habits through learning admirably, yet he still insists that our knowledge of extension, form and motion is not acquired through bodily sensation and feeling. What exactly Reid intends by maintaining this would require an analysis of what he means by conception and how he understands learning, but even without this analysis his errors are useful in that they point directly to the complex nature of concrete sensations.

That embodiment, and the development of sensorimotor skills, are the important factors in our apprehension of space and of the dynamical variables is no longer contentious, but stressing the importance of balance and orientation, and the involvement of the vestibular apparatus in every sense, is important once we start considering the philosophical disputes concerned with the epistemic status of subjective experience. Since considering the sense of balance not only advises that the world of experience is a unity, within which complex sensations are identified by the active perceiver, it also reconnects the subject to the objective world. The perceiving subject participates directly in dynamical relations. This challenges frequently expressed opinions on subjectivity. The separation of the subject from the objective world must be examined next.
Chapter 5

Sensations

In considering the counting problem and the specific criteria for counting senses, the problems of individuating and classifying sensations are encountered repeatedly. It is not enough to see attempts to solve these two problems as an exercise in comparing sensations and perhaps quantifying them in the style of psychophysics. The considerations already brought in as relevant to the task of individuating the senses show that distinctions working at several levels play into the basic questions of what sensations are, how they can be discriminated, and then classified.

Very different conclusions about the problem of counting emerge from various attitudes taken to these distinctions. Two extremes which illustrate this are attempts to defend the traditional count and even to claim that there could be no other on the one hand, and proposals that the traditional count and the criteria it is based on are irrelevant to the problem and modern theoretical considerations are sufficient on the other. The latter approach is usually tied to the insistence that organic structure and behaviour or the broad classifications which scientists use for physical interactions are sufficient, and in its most extreme form can even develop into the claim that the whole effort at individuation is misguided and so counting does not matter. While we may readily acknowledge that counting is of little importance, and this is reflected in the lack of concern about counting senses in scientific circles, it is essential to realise that individuation is a different matter.

We treat the two problems of individuating and counting senses separately, in connection with two quite distinct mistakes about the senses, because neglecting to separate them clearly can be a source of confusion. We have seen in discussing Aristotle’s problem in chapter 2 that Aristotle’s main concern was
to explain the workings of the soul. This means drawing clear distinctions so that the soul’s faculties could be *individuated*. This is not the same as trying to list a set of faculties and indeed Aristotle was not dogmatic about the number of outer wits, did not make a list of inner wits, and did not even draw a hard line between these inner wits and the higher faculties such as reason.\(^1\)

In dealing with individuation and counting, it is essential to bear in mind the fundamental relation between them. Individuation separates. It is a process of discriminating, dividing and distinguishing. Counting goes in the opposite direction, since it relies on ignoring certain individual differences in order to treat the objects counted as equivalent members of a set for some purpose. Whereas counting is impossible without some pre-existing effort at individuation, individuation stands alone and attempts at counting are additional, perhaps superfluous to it. Without making efforts to individuate episodes of experience we would die, since distinguishing food from poison, for example, relies on making basic discriminations. But counting very diverse substances in a single class called ‘food’ and other very diverse substances as ‘poison’ is a matter of convenience rather than necessity. We have seen that the same applies to expressing how we feel and what we perceive. Whether a feeling or a sensation is counted as belonging to a sense or not is not nearly as important as our being able to reliably report what it is.\(^2\)

The division between individuation and counting is not absolute and it may be argued that they operate as a polarity since to discriminate means taking something as a member of a certain class. But this does not undermine the basic asymmetry between discrimination and classification, and the fact that counting is highly developed only in some cultures, as well as the fact that various languages classify experiences and objects differently, shows clearly that classification and counting are cultural pursuits with room for arbitrariness.\(^3\) Also, as we have seen in examining the criteria for counting senses in chapter 2, in particular the criterion based on organic structure, individuation left unchecked by efforts to classify tends to produce ever finer discriminations and longer and longer lists of individual differences.

The considerations encountered in dealing with the problem of individuation so far all concern, as they must, the *separation* of one thing from another,

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\(^2\)See section 3.2.

\(^3\)John Ellis gives a clear account of how individuation and classification operate in the lexical and grammatical aspects of language in his *Language, Thought, and Logic*; Ellis (1993).
and using the results to say something about the sensations or, more broadly, the perceiver’s experience. The last chapter dealt primarily with the suggestion that the senses cannot simply be separated by noticing the differences between the iconic sensations—between what it feels like to experience colours, sounds and smells, and to make active discriminations between these without confusing them. That basic approach cannot even explain the traditional count. To understand that system one needs to consider the perceiver’s somatic and emotional states, and these must somehow be separated from what is taken to exist apart from, or ‘externally’ to, the perceiver.

The sense of balance is a good test case here because dealing with it reveals that any separation of the perceiver from the perceived object is merely notional. In actually perceiving, the individual enters into a dynamical relation with objects in the environment: an active perceiver and a responsive environment are both essential to each experiential episode, the perceiver’s actions are constitutive of what is perceived even if the perceiver does not have overt knowledge of their role in a particular instance, and the perceiver’s somatic and emotive states are not, as a matter of fact, easily separated from what the perceiver may be inclined to take as given, objective and external. By extension, what applies to physical effort and emotional affect can be expected to apply also to the perceiver’s cognitive activity—to their power of conceiving and ability to judge, to put it in Reid’s terminology—and this can be seen to underlie some of the important phenomena associated with attention, such as change blindness and the inability to discriminate stimuli when these are deprived of proper context or limited artificially to a single sense.

The sense of balance also illustrates the need to consider sensations more broadly than taking them to be simple elements of experience lacking structure and attempting to match them neatly to organs—visible qualities with eyes, audible with ears, etc. Recent discoveries on the role of the vestibular apparatus in experience indicate that the spatial and kinetic content of the visual field is constituted by actively integrating various sources of information. This applies to other sensory modalities, such as what is traditionally called touching. Not only can this complexity be seen as a general truth about how the senses operate and are used by perceivers, i.e. that the senses do not operate independently of each other, it suggests that our apprehension of what were traditionally called the primary qualities of matter is no less sensory and relational than our apprehension of colour, warmth and other so-called secondary qualities. Whatever heuristic merit there may be for the development of mech-
anistic models of physical objects in separating the properties and qualities of objects into inherent and relational categories, this separation is not necessitated by the facts of perception, or even supported by investigations of how perceivers actually come to know anything about the world.

Laying emphasis on the role of the perceiver in the formation of their own experience raises a range of sceptical worries, particularly the notion that the perceiver cannot ever really know the world as it is, or arrive at truths about objects which say something about these objects in themselves, apart from their relations with sentient perceivers. If these worries introduce and then lay stress on the arbitrary acts and judgements of a lone perceiver, then it is understandable that objectivity might be seen to be threatened, but there is no pressing need to overvalue the contributions which particular individuals make. A more sensible approach is to recognise that when it is claimed that active perceivers play an ineliminable role in the formation of their experience, this means only that while their specific act is necessary, the meaning, intent and structure of their act could well be as predictable and explicable as the trajectory of a lump of stone dropped from a tower. There is thus no reason to object, ahead of a critical investigation, that considering the perceiver’s subjective experience amounts to subjectivism. The contribution of individual subjectivity to experience is a matter for investigation, not something to be eliminated by definition. The fact that approaches which attempt to delineate subjectivity, and then ignore or eliminate it, have been used, is testified by the separation of primary from secondary qualities and the more recent efforts to get rid of subjective experience altogether from the discussion of sense perception.

Considering the relational nature of all perceiving shows that there are two quite distinct ways to construe the question whether our senses operate independently. The first was highlighted in the last chapter, where it was pointed out that normal use of the traditional sense modalities exploits what might be called ‘crosstalk’ from one sense to another, as well as surprising yet essential contributions from both the individual acting perceiver and sets of organs which are rarely discussed and poorly understood. To recall one example, in the estimation of Patrick Wall it is ‘astounding’ that stimulation of vestibular organs can fully restore sensations lost due to brain damage.4

The second way to construe independence is to go further into the question of what the perceiver contributes to their own experience. Here it becomes

4See page 137 above.
clear immediately that the first step is to ask who the perceiver is, and whether they are acting as if they were a lone, unconstrained ego, or whether they are subject to social, biological and physical constraints. If it is acknowledged that the perceiver is a social being and an organism with organs specialised in function, then it makes sense to claim not only that the individual’s sensory organs operate in ways that make these organs dependent of each other, but also that how these organs operate in other individuals of the same kind or social group informs how a particular individual uses them. To put it bluntly, what one member of a clan or ethnic group notices and sees, depends on what others have seen and pointed to. What one individual values and discriminates effectively, depends at least partly on communal traditions and commitments. Since the individual’s values and efforts are constitutive of what is perceived, it follows that the individual’s social environment will play a role in what the individual perceives and how they manage to do so.

Since different ways of separating the individually acting perceiver from the world which they perceive can lead to quite diverse conclusions about the importance of subjectivity, it is important to be explicit on which principle of division is assumed when the problem of individuating the senses is addressed.

The individuation of the senses has so far been presented as a task of individuating sensations, distinguishing and classifying them in ways which accord with not only common and commonly shared experience, but also indirectly acquired (theoretical) knowledge of physical processes, and of the organic structure of our bodies. The independence of the traditional senses was disputed in the last chapter on the basis that they are not only used collectively in routine perceptual tasks, but also share functionality and organs common to various perceptual and motor tasks and skills.

The concrete sensations which the task of individuation encounters are not simply sounds, scents, sights, etc. but rich episodes pregnant with meaning. Colours are localised, sounds become audible and fade, and so on in myriad combinations and transformations. An attentive, thoughtful working with these experiential events can dramatically transform them, from one encounter to the next, or even from one moment to another. From this point of view, subjective experience provides the raw materials for any discrimination, and sensations are complex. They are not simple elements of experience, and if a specific experience is found to be simple, then this is an achievement of concentrated attention rather than something available without the perceiver’s directed efforts.
Dealing with sensations and using them not just to individuate the senses, but to explore the world, brings with it the need to talk about sensations generally. Because the claim, already advanced in the last chapter, that sensations have not been given their due in the individuation debate is a strong one, further justification is offered in this chapter. We begin by citing a range of opinions and approaches to dealing with subjective experience. The prevailing advice to ignore sensations or explain them away is then attributed to the uncritical acceptance of two troublesome distinctions, separating what is private and subjective from the public and objective. After making explicit the various ways in which the individual enters discussions of perception and perceptual development, the two basic distinctions along with the relevant predicates applied to sensations are examined. We show how prior commitments are operating in the efforts to denigrate sensations. It is concluded that there is no need to adopt a negative stance toward sensations and subjectivity. There is also, as we have already seen, no support for it in scientific procedure.

Some of the trouble with talking about sensations arises in a modern attitude, which takes subjectivity to be something of value and significance only for the lone individual, the subject. By going back to earlier senses of the words ‘subjective’ and ‘objective’, an alternative to this is suggested so that sensations regain their rightful position as the fertile ground of experience, and the categorical labels now routinely applied in philosophical treatments of sensations—calling them private for example—are recognised as troublesome or even pointless.

### 5.1 Individualising Sensations

Bringing the sense of balance and the vestibular apparatus into the task of individuating the senses introduces some new difficulties. One of these is that there may now be less certainty in the application of the word ‘sense’. Is the sense of balance truly a sense, as Reid advised? And if it is counted that way, what are we to make of the shared functionality which certain organs provide, so that the neat match between a sense and an organ, or a pair of enantiomorphic organs, is lost? Should organs now take priority—as Geldard explicitly advises\(^5\)—so that instead of a sense of sight we should begin to speak of an eye sense and a vestibular sense, both instrumental in ordinary seeing?

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\(^5\)See Geldard (1972, pp. 258–259).
5.1. INDIVIDUALISING SENSATIONS

The four main criteria used to decide what a sense is do not seem to allow us to devise a coherent system and a definitive count. It is fair to say that the discovery of the bodily senses, their functionality and the organs which serve them, has not helped greatly. Rather than dividing the senses, this new knowledge reveals layers of complexity in how the organs work in concert, and how the actions and habits of the perceiver exploit this complexity in the pursuit of specific goals such as locomotion, eating, identifying and locating individual objects, and so on. This co-operative complexity is implicit in ordinary experience and constitutive of it.

There is, however, an indication of how to proceed when the traditional count is reconsidered. The role of the iconic sensations in classifying sense experience has been asserted repeatedly in the foregoing, and the ability to discriminate between these iconic sensations is evident in anyone who has the requisite senses. If there is a problem in how many senses to count once the bodily senses come to notice, it has nothing to do with an inability to discriminate sensations reliably. It arises mainly in asking why some sensations are assigned to a sense, while others are called feelings, or even closely aligned with emotions.

The traditional count is wise in that it divides qualities which are mainly associated with the objects of the outer world, from sensations that pertain to the body. The body is a uniquely important object for the individual perceiver. What the perceiver feels of their body is the basis of using it for all the necessities of an active life. These bodily sensations and feelings are so crucial to the identity and activity of the individual, that it is usual to say that they are private to the individual—to the extent that even the word ‘sensation’ applied to the experience of objects in the outer world is a little awkward. Calling a colour or scent a ‘sensation’ gives the word a technical flavour, and the more common way to speak of colours and scents is to call them properties, or qualities, or even characteristics of objects. Nevertheless, the division between the outer senses and somatic experience is still based on sensations and feelings, on the quality of the experience we have when enjoying or suffering these sensations and feelings, and the separation of the senses into five is equally grounded in the vivid qualitative differences experienced.

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6 Clark notes that “many psychologists now prefer to avoid the term ‘sensation’ altogether, perhaps because of its introspectionist connotations. But the contrast lives on in philosophical discussion”; Clark (2007a, p. 446). A well-established textbook on the psychology of perception, Goldstein’s Sensation and Perception, gives ‘sensation’ the honoured place in the title but barely mentions sensations in the text; Goldstein (2007).
Sensations thus play the key role in separating one sense from another, and in discriminating various aspects of bodily experience. There is *nothing else to make discriminations of* and as Peirce noted, “if we were to expunge the sensuous element from our ideas, we should leave our minds a blank”.\(^7\) Considerations of organic functionality, behavioural traits, and theories of the nature of the proximal and distal stimulus are all sources of important additional information on the senses, but they are all secondary to this primacy of experienced sensations. The secondary factors may become important under extraordinary circumstances, when perhaps organic function is impaired or hallucinations need to be put into context, but it is not necessary to know which sense organs are being used to notice a scent or hear a sound or to stand upright, and all the indirect information on how the senses operate can not, as a point of procedural logic, replace direct experience.\(^8\)

Judging by comments made in the philosophical debate on the counting problem, using sensations in the way just pointed to is unpopular in some quarters. Such comments are particularly instructive for helping us grasp the full problem of individuation. As we have already seen, there is a tendency in this debate to avoid the high road toward individuation: that of using sensations. The reasons for this tendency, which is shared by contributors holding quite diverse sets of philosophical commitments, needs to be explored, and the source of what appears to be a widespread anxiety in talking about sensations, revealed in efforts to keep any discussion of them out of the problem of individuation, must be located. Only then can we determine whether the worry is substantial, and what assumptions or mistaken views might be motivating it. This is important, since denying the basic role of sensations in the continuing task of the analysis of experience, which determines how we identify and classify senses, leads to mistakes which are only too apparent.

Two examples of these mistakes have been noted already. The first mistake is seen in suggestions that the traditional senses are not simply individuated on the basis of the iconic sensation—on the evident differences in the subjective experience or ‘feel’ of colours, sounds, etc.—and that an awareness of which

\(^7\)And, it may be added, there would be nothing to think about and nothing to discriminate. See Ransdell (nd, p. 11).

\(^8\)If a fragment of Democritus quoted by Galen is genuine, then Democritus understood the futility of trying to denigrate sense experience by reasoning. The famous remark about atoms and the empty, quoted on page 2, is answered: “Poor thought, do you take your warrants from us and then overthrow us? Our overthrow is your fall”. See Barnes (1987, p. 209).
organ is employed in sensing provides the answer. Although proprioceptive knowledge may play a part in determining that everything is going well and even in constituting the perceptual experience, it evidently does not obviate the need to deal with sensations. After all, proprioceptive knowledge consists in somatic experience—i.e. feelings and sensations.

The second mistake is inverting the epistemic authority of theory and experience, and pretending that once a useful (even if partial and provisional) theory of the stimulus or of the workings of the neurological mechanisms associated with perceiving has been devised, then further concerns with the experience—the phenomena which this theory is intended to partially ‘save’—can be dispensed with, and the theory taken as the authoritative basis for further explorations. This attitude to theory is wrong. Neither the ordinary, wakeful human experience nor the sensations selected from it for attention can be eliminated from any discussion of how the senses function, or how they might be individuated and counted. In this sense at least, the analysis of experience and those results of attentive analysis which we have, along with Reid, been calling sensations, must always remain fundamental.

Three steps to understanding and dissipating the philosophical anxiety connected with sensations are now taken. The first is to briefly confirm that the advice to ignore sensations, or at least the opinion that they are not needed or can safely be explained away, is indeed given. The second is to examine some of the reasons offered when we are advised to forget sensations. The third is to ask whether these reasons really justify the advice. This last step reveals some problematic distinctions behind the basic worry, and it is in looking at these that a most important aspect of individuation is revealed. In the last chapter, we have seen that the traditional senses do not operate individually in that each of the traditional modalities is a combination of multiple organs and functions. These work together and overlap not just in specific perceptual tasks, but they constitute a unitary experience. It now remains to be shown that the senses do not operate independently, which is to say separately or idiosyncratically, in separate perceivers.

5.1.1 Ignore the Sensations!

We have already come across some efforts to denigrate sensations and to deny their central role in distinguishing the senses in the third chapter. It will be recalled from there that Brian Keeley has called them “folk-scientific entities”;
he also insists that “both proper objects and sensations are nonstarters when it comes to solving Aristotle’s and the star-nosed mole problems”.  

Although this attitude to sensations might be expected to be associated with materialistic commitments, there is no necessity in this, as David Armstrong’s enthusiastic adoption of sensationalist terminology shows. What is more disturbing than any attack on the usefulness of subjective experience from a materialist is the view that sensations—at least the iconic sensations of vision, hearing, etc.—play no decisive role among the proponents of a wide range of metaphysical and psychological doctrines.

An influential example is the case of the ecological psychology with which Gibson has so creatively approached the problems of perception. Since the activity of the organism is recognised in this general framework, it is natural to ask on what basis the organism acts. According to Gibson, the answer is found in entities called ‘affordances’ to which the perceptual systems are attuned, rather than in meaningful sensations, sensations which function as signs with meaning as they do in Reid’s epistemological scheme. For Gibson, sensations are a largely meaningless accompaniment to the goal seeking which has arisen in the evolutionary biology of various organisms. This is a counterintuitive conclusion when we consider that some of our most intense sensations are of pleasure and pain, and these would seem to be immediately informative. They could hardly be called superfluous. For example, congenital analgesia, the disorder which renders the sufferer unable to feel pain, tends to result

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9 Keeley (2002, pp. 22–23), emphasis original. Incidentally, we have seen in section 2.1.5 that there is no distinction between the proper objects of each sense and its sensations in Aristotle. That distinction, made explicit in the Gricean criteria which Keeley disputes in connection with this quotation, is a modern one, and operates in Reid’s epistemology as the ambiguity of a sensation of a secondary quality and corresponding occult property of the object.

10 See Armstrong (1962) and Armstrong (1968). ‘Sensationalist’ is intended here only to say that Armstrong is keen to name and classify sensations, apply predicates and generally treat them as informative objects, instead of opining that they are not worth discussing.

11 See, for example, Gibson (1968, pp. 55–56). In discussing sensations Gibson is usually disputing some theory he finds flawed: “This is what I meant by suggesting that visual sensations were irrelevant for visual perception; I meant sensations, not sensitivity. [. . . ] most of us until recently, [identified] the problem of information pickup with that of having sensations, but this is a confusion. The mechanism of information pickup entails sensitivity but is not one of getting and then interpreting the so-called data of sense”; Gibson, in Reed and Jones (1982, p. 74). This is not a denial of subjectivity, but remains an insistence on separating the ‘phenomenal feel’ from ‘information’ to avoid a “confusion”. This categorical separation can be detected in all of Gibson’s comments on sensations and his adoption of a strong distinction, citing Reid, between sensation and perception—see Gibson (1968, p. 1).
5.1. INDIVIDUALISING SENSATIONS

in (perhaps largely inadvertent) behaviour causing repeated injury and early death.\textsuperscript{12} In any case, if an evolutionary story is to be told, then surely sentience and the role that meaningful sensations evidently play in it should be part of the \textit{causal} story, since our acts are spurred by and, in at least that sense, caused by sensations and feelings.

Sensations also occupy a problematic position in Alva Noë’s enactive approach to perception.\textsuperscript{13} It would not be correct to say that Noë suggests that they are an epiphenomenal foam floating uselessly on the real business of perceiving, but by founding perception on sensorimotor skills his picture has a tendency to push sensations aside in favour of theoretical accounts of skilled motions. On Noë’s account, it would seem that even colours are enacted, and without moving appropriately we cannot be expected to see colours. It is true, of course, that just what colours we see depends on the details of how we move, but it is more difficult to fathom just how colours magically appear when a previously unmoving human subject begins to act.

We have noted the intimate links between vision and balance in mature human subjects in the last chapter, but what is known about the world of the infant suggests that as babies grow and acquire motor skills, their sensations are organised into regular patterns and meaningful associations, rather than brought into existence \textit{ex nihilo}.\textsuperscript{14} All this was already evident to Reid, who carefully distinguished acquired from original perceptions, and noted that the infant’s movements and explorations are to be understood as the process of learning to perceive.\textsuperscript{15} In any case, the general approach suffers from a theoretical inconsistency in that sensorimotor skills are treated as if they could be explored and discussed independently of the world of meaningful sensations. But what we mean by acting and moving is \textit{only the experience of sensations}, augmented by indirect knowledge of how the body operates during these efforts.

This criticism implies that the enactive approach may share a methodological weakness with other approaches already discussed in section 3.2.2. These generally pretend to explain, or even explain away, the world of experienced sensations by invoking processes at a supposedly more fundamental

\textsuperscript{12}Wall (2000, pp. 49–52).
\textsuperscript{13}Noë (2004) and Noë (2002).
\textsuperscript{14}For more on this issue see Trevarthen and Reddy (2007).
\textsuperscript{15}See especially Reid (2000, p. 201). For Reid, this is not learning to \textit{sense} but learning to make sense of sensations, i.e. to perceive.
level. Telling symptoms that this may also be the case in the enactive approach can be found. As Noë explains it, in the enactive approach

similarities and differences among sensory modalities, and differences in perceptual content within a modality, are explained in terms of the different kinds of sensorimotor skills perceivers draw on in their exploratory activity.\(^\text{16}\)

Further:

The enactive approach seeks to explain the quality of perceptual consciousness not as a neural function caused by and realized in the brain [...] but rather in terms of patterns and structures of skillful activity.\(^\text{17}\)

In arguing that the senses do not operate independently, we have been urging the importance of effort and skill and how these are embedded in the traditionally recognised sense modalities with their localised sensations and external (visible, hard, textured, flavoured, audible, etc.) objects, but this recognition of joint action is quite different from a claim that any kind of motion, skilled or other, can provide a satisfying explanation, something “phenomenologically apt”,\(^\text{18}\) when the question of differences between scents and colours, or sounds and tastes comes up. That would be analogous to Locke’s impacts.\(^\text{19}\)

In privileging activity, Noë hopes to not only explain perceptual experience, but to overcome the traditional separation of what are called the representational content (intentionality) and the introspective feel (quale) of an experience.\(^\text{20}\) He is right that this issue is important, and the struggle to do justice to both the qualitative feel and the meaning of sensations pervades much of the philosophical work on perception not preoccupied with answering sceptics, but his approach is too similar to what we have already seen advocated by O’Dea,\(^\text{21}\) and dismissed as trying to explain sensations by invoking a privileged subset. Noë, just like O’Dea, is quite explicit on the role that our doing is playing, in saying that

\(\text{Noë} (2004, \text{pp. 225–226}).\)
\(\text{Noë} (2004, \text{p. 227}).\)
\(\text{Noë} (2004, \text{p. 228}).\)
\(\text{See page 108 above.}\)
\(\text{See Noë (2002) for his specific use of these terms. William Fish relates the two aspects to the epistemological and phenomenological approaches to the problems of perception; Fish (2010, ch. 1).}\)
\(\text{See section 3.2.2.}\)
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there are indeed qualitative differences in the character of perceptual experiences that are not differences in what those experiences represent. On the view developed here, to see is to explore the environment by means of the exercise of one’s visual apparatus, e.g. one’s eyes. The activity of seeing thus depends on one’s awareness (at least sometimes) of one’s eye movements, also on head and body movements, and so on characteristic patterns of bodily sensation. […] The occurrence of bodily sensations […] contributes to what it is like to have an experience, and it does so in ways that are for the most part independent of the representational content of the experience. What determines the quality of experience, then, is two-fold. First, there is what you experience (the representational content). And second, there is, roughly, what happens to you while you experience. The qualia theory is right that there are nonrepresentational qualitative features of experience. But it is wrong to characterize such features as intrinsic properties of the experience. These nonrepresentational properties are in fact just features of what you happen to do when you are engaged in the activity of looking (say).²²

However, not only do we come to know what we happen to be doing while looking or listening exclusively through feeling body parts, making efforts, etc., these actions and our awareness of them cannot turn colours into sounds, no matter how skilfully we twist and turn.

There is a great deal to agree with in Noë’s diagnosis of the problems encountered by both the representationalist and the sensationalist approaches to experience, and taking issue with the explanatory methodology here should not distract us from much that is of value in his thinking. Some of this will become relevant in discussing vision in part III. On the topic of individuating the senses according to sensations, however, it remains true that the intrinsic qualitative differences between modalities which are unproblematically evident to common sense and to the naive understanding are being explained away by Noë:

Seeing is different from touching or hearing, not because of a difference in what these senses enable us in the end to learn about the

world (representational content), or in their “introspectible characters” (sensational content). It is different because the temporally extended activity of seeing is a different activity from that of hearing or touching. We do different things, make use of different body parts, rely on different features of our environmental situation, and, as I have argued, encounter different features of reality (different appearance-spaces).23

If these “appearance-spaces” are there to be encountered, then surely the iconic sensations have a determinative role in telling us which space we are in. Alternatively, if sensational content—introspectible character—is not determinative, then our doing must be effective in some truly astonishing ways, not only in moving things around but in lighting up the landscape and enlivening it with sounds.

Rather than accepting intrinsic differences between sensations and saying that it is these very differences which are the basis of their meaningfulness for the perceiver, efforts to deprecate sensations are driven by concerns about their epistemic status and value. A spectrum of approaches is evident; from resolute neglect of subjectivity by Stoffregen and Bardy,24 to the advice that sensations can play no part in science by Keeley,25 through efforts to tame sensations by aligning them with ‘qualitative determinables’ by Ross,26 and quantifying them by the use of psychophysical methods by Clark27 so that they can become available to scientific scrutiny, all the way into attempts to provide causal accounts of how sensations feel to individuals devised on the basis of evolutionary, neurobiological or neurophysiological models. Given these efforts, it seems that there must be something inherently troubling about sensations, making it unattractive to accept them along with other brute facts of existence as the raw data upon which any inquiry proceeds, data which no methodology can eliminate, dismiss or simply ignore.

A justifiable cause for concern might be that while we are all acquainted with sensations adequately enough to deal with them, the meaning of the word ‘sensation’ or the underlying concept is not sufficiently clear in its philosophical and scientific use, so that the contributors to debates on the counting and

24 Stoffregen and Bardy (2001).
26 Ross (2008).
27 Clark (1993).
individuation problems are talking at cross purposes. The ambiguities in use and some of the most important distinctions affecting the meaning of ‘sensations’, ‘phenomenal feel’, ‘qualia’ and related expressions have been recently considered by Keeley and Clark. Both find the relevant terms, especially ‘quale’ and ‘qualia’, troublesome and equivocal. The most important sources of dissent and confusion arise from questions about whether having sensations must mean being conscious of their qualitative character, and whether this qualitative character, or ‘quale’ of the experience, has any role to play additional to that ascribed to the representational content of that experience. A further source of trouble is that some philosophers use ‘qualia’ synonymously with atomic sense data while others, notably Peirce who is responsible for one important usage of ‘quale’, suggest that complex events and situations have their own unique and unitary qualia.

We have so far used the term ‘sensation’ to refer to identifiable factors in experience, making no effort to distinguish between what might aspiringly be labelled ‘simple sensations’, or complexes of such factors, and episodes of ordinary wakeful awareness which are furnished by a more or less meaningfully connected matrix of objects, events, feelings, thoughts, as well as complex, concrete sensations. The sensations selected for attention and associated with specific senses have been called ‘iconic sensations’, with the understanding that these do result from attentive efforts and are thus justifiably called ‘abstractions’ in contrast to the complex, multisensory flow of concrete experience. Whitehead’s use of ‘abstract’ in this context is not in contrast to a Humean description of the iconic sensations as vivid or lively. It merely signals the fact that taking these results of the perceiver’s efforts as given data is a fallacy—a version of Whitehead’s fallacy of misplaced concreteness.

\[\text{28} \text{ Keeley (2009).} \]
\[\text{29} \text{ Clark (2007b).} \]
\[\text{30} \text{ See Peirce (1958a, 6.223), emphasis original. He goes as far as saying that there is “a peculiar quale to my whole personal consciousness. I appeal to your introspection to bear me out in this”.} \]
\[\text{31} \text{ The locution here should not be taken to mean that any awareness of objects can be separated from sensations. Cf. Peirce in the previous footnote.} \]
\[\text{32} \text{ See quotation on page 75.} \]
\[\text{33} \text{ Whitehead (1925, ch. 3). For Whitehead, the use of abstraction is clear: “The advantage of confining attention to a definite group of abstractions, is that you confine your thoughts to clear-cut definite things, with clear-cut definite relations”; Whitehead (1925, p. 85). Whitehead is also admirably clear on the fact that turning the priority between abstract theory and concrete experience upside-down is a mistake: “The explanatory purpose of philosophy is often misunderstood. Its business is to explain the emergence of the more} \]
sentiments can be discerned in Peirce’s discussions of qualia,\textsuperscript{34} and even in Merleau-Ponty’s treatment of sensations.\textsuperscript{35}

The term ‘qualia’ has been avoided in the foregoing because it is, as Keeley and Clark point out, a troubled term. While its role is clear in Peirce, it has a special use in his triadic metaphysics of signs and he employs it rarely, normally being content with ‘sensation’ used in ways close to how we have used it. More recent uses of ‘qualia’ rely on a representationalist framework which inserts a mediating entity between the perceiver and the world, so unless one wishes to adopt that framework using the term only adds to the confusion. As Clark points out, ‘sensation’ is now largely archaic except in philosophical use but that, and the fact that Reid uses it, is one of its main attractions. That is why it has been used throughout, even though our use may not agree entirely with Reid’s.

In the treatment of sensations as the basis for individuating and counting senses, the distinction between the representational content and the qualitative feel of experience has so far been hardly attended to, and it might be thought that respecting and employing that fundamental distinction must surely be the starting point of any informed discussion. But this is the crux of the matter. As we will see, the very distinction is specious. It is not something to be admitted and then overcome as Noë attempts to do. On the contrary, the source of the distinction is a theory of mind which is best ignored when we try to individuate and count the senses.

\subsection{Two Worrying Distinctions}

It is neither practical nor necessary to address all of the theoretical problems just raised in connection with the various uses of the word ‘sensation’ as it applies to individuating and counting senses. Certainly, several important

\begin{quote}
abstract things from the more concrete things. It is a complete mistake to ask how concrete particular fact can be built up out of universals. The answer is, ‘In no way.’ […] In other words, philosophy is explanatory of abstraction, and not of concreteness”. Whitehead (1960, p. 30).
\end{quote}

\textsuperscript{34}“When a quality is thought about as a distinct object, it is said to be thought abstractly, and is called an abstraction; and nouns formed from adjectives and expressive of such abstractions are called abstract nouns. It is a great blunder in logic to confound abstraction in this sense with the operation of precision, or separation in supposition. Many thinkers speak of “mere” abstractions, implying some degree of contempt. But thinking abstractly, in the sense of isolating characters and thinking them as distinct objects is the only way to think clearly and efficiently”; Ransdell (nd, p. 10), emphasis original.

\textsuperscript{35}Merleau-Ponty (2002, introduction).
questions arise: the problem of consciousness, the problem of intentionality and the ontological status of subjective experience to name just three. However, in seeking a source for the worries about sensations in accounts of subjective experience, the worries and qualms reflected in efforts to select out objective components in that experience, it is again useful to seek clarity by considering the traditional count.

The direct relevance of these efforts to separate the subjective from the objective, or the private from the public, in the individuation and enumeration of the senses has already been shown, and the difficulties introduced by the realisation that in our apprehension the primary qualities are no less sensory and relational than secondary qualities have been covered in some detail. The traditional count of senses has been faulted in that it neglected bodily sensations and feelings in favour of attending mainly to external objects. What is lost in this is the unity of experience, as if a simple division between the embodied perceiver and the external world could be made with the proviso that the body belongs to the individual, and experience of it is therefore private and subjective in the sense that the experience also belongs exclusively to that one subject, whereas experience of other objects, apart from the body, subsists in an objective space accessible to other perceivers. There is admittedly a wisdom in this separation because it reflects the special value of the body to the individual, but this valuation must be nuanced and moderated by the recognition that the body removed from its nourishing environment is of no value at all.

If the division of the perceiver from the surrounding world could remain unselfconscious, then one might envisage that separating the subjective and objective realms in experience could be as simple as making a division at the skin. But the first step beyond a naive captivation by the phenomena comes in the noticing which attends self-conscious knowing, the noticing by the perceiver that they play a role in what arises in experience, that it is just this individual ‘I’ who is perceiving the world, and where this subject is and what the subject does matters. This can quickly lead to the thought that all experience is private. As Lichtenberg so provocatively put it, “not only is the rainbow different which each of us sees, but each of us sees a different object and a different sentence”. The motivating example is beautifully chosen since the apparent position of a rainbow does in fact depend on the location of the observer, and to ask where the rainbow is if there are many observers, or none, quickly generates conundrums.

Mautner and Hatfield (1959, p. 71).
The apparent privacy of all experience which follows from the recognition that we cannot quite step into each other’s shoes when we need to deal with objects is made more acute by the necessity to attend to and to judge the objects which we deal with. Attention and judgement come with failures to notice and misjudging. Sceptical concerns then closely follow. It is surely this, the unpleasantness of being mistaken, that underlies efforts to redraw a line around what is true, objective and real, and to separate it from the deceptive, illusory and idiosyncratic, and to devise methods whereby the boundary can be maintained. As soon as all subjective experience has been seen to be private, the need to recover some objectivity becomes urgent.

It is the characterisation of subjective experience and its sensations as private that is the source of doubts about the epistemic value and status of sensations. If our senses reach only as far as the boundary between the private and public, and if we cannot shift this boundary by insisting that we somehow have access to the regions which lie beyond it, or can burrow through it into a world of objective abstract relations and ideas by giving sensations not just a phenomenal feel but also a representational content, then the problem which Reid identified as central to the debate—that we perceive nothing but our own sensations—has no solution and we are faced with the sceptic’s triumph. We have already examined Reid’s solution based on primary and secondary qualities, a path apparently destined to lead to a multiplication of increasingly abstract yet conflicting constructions. But there is an alternative, which becomes apparent as soon as we realise that the boundary between the perceiver and the world was badly drawn in the first place.

5.1.3 The Perceiver Apart

The drawing of a boundary between the perceiver and the perceived world has been a source of confusion. It does not do to say that we perceive with our senses only what is outside of our body or in contact with the skin. In fact, the whole idea of putting a boundary between the individual perceiver and the ‘external’ world is problematic. It is made into a source of insoluble muddles by failing to keep apart different principles of division, especially the subjective Cartesian one and the naturalistic nomological one.

The modern tendency to naturalise the process of perception emphasises biology and psychology. Many who are basically sympathetic to science and adopt a broadly naturalised approach to the problems of perception tend to
lay emphasis on the individual acting organism, be it a human being, a fly, or whatever individual can be considered to have some perceptual ability. Examples of this approach, already mentioned, can be found in Gibson’s ecological psychology as well as in Noë’s enactive theories, but a tension arises for these approaches when it is asked whether an actual individual is really being considered, or is merely being asked to serve as a representative of a group or species. There is actually a variety of dividing principles that can be used when perceptual experience is considered.

The Cartesian one is, it may be supposed, between the I and the world. In this context what comes to the foreground is a problem of ownership, the problem of deciding, in self-conscious deliberation, what is me and my doing and what is not me, what are actions and processes I neither control or take responsibility for, and how much I really know of the actions which I stand by as mine. The boundary of the skin is largely irrelevant here, since I do not always, or even often, identify simply with my body.37

Another dividing principle is between a member of a species or genus and its environment. Whether this separates out an individual or the collection of members is of secondary importance, but this division is based primarily on varieties of biological structure and behaviour. If one wanted to discuss human sense perception with a biological emphasis, the question may then arise which organisms can belong to the representative group, for example which primates might see the world similarly to the way that we do (as flies with their compound eyes don’t, and for various reasons neither bats nor birds do either).38

The biological approach with its de-emphasis of the individual—or its use of the individual as an exemplar—goes at least some way against the tendency to draw a boundary around an organism, usually using its skin, and asking only how the organism perceives stimuli or signals arriving from outside. We cannot truly excise the organism out of the surrounding world, since it is clear, or should be clear, that the sense organs are adapted and attuned to the world, and their normal functioning can truly be appreciated only if one considers the animal together with its environment.

Gibson, for example, in his more provocative moments insisted that perception is not something that happens in an organism, it is not even something

37 Many fascinating insights on the problem of ownership and control can be found in the work of Raymond Tallis. The kernel of the problem can be summed up in a slogan: “What I attend to is not me, the attender”; Tallis (2008, p. 46).
38 For detailed information on this, see Ings (2007).
that an organism does, it can only arise in an ecological system where the organism and its world each play their part. Not only does the animal act, its environment offers itself in specific ways, and there is a constant two-way traffic between the perceiving creature and the world perceived.

Yet another dividing principle can be founded on the physiological functioning of the sense organs and the physical and chemical constraints under which they operate. It is scientific common sense to assert that the individual perceives light, heat flow, the chemical structure or reactivity of various molecules, and physical properties such as hardness and weight, or parameters such as inertia and pressure. These can be opposed to the unperceived firing of neurons or the chemical activity underlying the functioning of the perceptual systems. Here again the boundary of the skin is irrelevant.\footnote{This physiological boundary is the one used by Keeley; it is placed between the central nervous system with its nerve endings, and the world. Cf. Keeley (2002).}

In these three ways that the perceiver can be distinguished or divided from the perceived world, it is debatable whether the common sense boundary of the skin is important and what a phrase such as ‘the external world’ is actually worth. The skin is only one of the stopping points for the Cartesian awareness which fluctuates wildly in its judgements of ‘self’ and ‘other’. These judgements have more to do with intentions and frustrations than they do with the body, and even personal emotions, thoughts and desires can be classified as ‘other’ in various circumstances.

The skin may be a little more important when individual organisms are considered, but here it must be kept in mind that the individual perceiver has almost no significance when we consider biological and physico-chemical processes. There is nothing interestingly individual about a particular cat, tea bush or human baby when we are investigating such processes. There is nothing generally significant even in the uniqueness of their genetic make-up. As far as all these processes go, one organism is as good as any other member of the species, and individual variations need to be considered only in so far as they affect normal functioning and set the sample size requirements for collecting the statistics which are used to define and gauge what passes as normal.

There is yet another way to make a division, one that has not been mentioned thus far. It may be the most important dividing line for humans when one wishes to understand the full complexity of human behaviour. The skin and the individual are also of little fundamental importance for this fourth way
of systematically separating the perceiver from the perceived, since this line of separation lies between the world and the culture in which the individual is nurtured and formed.

This is the dividing line not just between different linguistic groups, but between human cultures living in different environments, drawing on different traditions and exercising different habits of life. These differences are not trivial or unimportant. They are of primary importance for daily life with its shared values and joys and sorrows, its evaluation of what constitutes a perceptual insult and which objects and events are worth discriminating and noticing. If we wish to understand how an individual perceives, we need to consider how their social group perceives. That is where—subject to some poorly defined biological and physical limitations—actual perceiving first arises and develops.

Taking this seriously implies that misgivings arising from admitting that perceivers play a constitutive role in what is perceived are not mainly about what is true or objective in individual experience, but mostly about what satisfies these labels in the collective experience of a culture. It is easy to see that an individual is largely insignificant here, since cultures routinely label the perceptual reports of idiosyncratic individuals delusional, fanciful or mistaken. Thus, saying that perceptual discriminations are achieved rather than given and that perceiving is a skilled activity, is not at all the same as saying that individuals are unconstrained in how this is done. It does not even follow that an individual must have much say in it at all, since correctness is determined and any praise or blame are allocated socially.

Further, saying that individual senses and sensations are separated and classified according to tradition and shared knowledge does not mean that every culture can simply decide whatever suits. It is merely saying that how the senses are used—which are developed and which left to atrophy—depends on cultural factors and is therefore subject to evolution and change. It is the contrary thesis (any suggestions that perceptual systems are somehow fixed in their count, range or operation) which does not make sense, even biological sense, and can only be entertained as a heuristic supposition for some limited purpose.

Finally, just as languages evolve rapidly according to the needs and inventiveness of each culture, the evolution of perceptual systems is not entirely constrained by evolutionary biology. When one considers the tremendous historical developments in the culture of food and drink, to cite just one example,
there are good reasons to think that biological constraints are only a small part of the story.  

Placing social relations centre stage when considering perception was urged by Charles Hartshorne when he wrote:

The attempt to treat the social aspect of mind in its widest sense as in any fashion derivative from the purely private, or the latter as in any wise independent of the former, belongs with all attempts to treat relations as secondary features of the universe. It is time that such attempts be dropped. It is time that we shook ourselves free forever from all doctrines that treat the private as anything but an aspect of the relation of mind to mind. [...] The point is that there are two possible views: either mind or awareness as such is logically dependent upon other mind or awareness, or it is not. The latter view has been tried. It has led to all the paradoxes of epistemology, and to a disastrous attempt to found duty upon self-interest. The other view has scarcely been tried at all.  

The strident tone here may detract from the nobility of the message, but we have already seen enough examples of dogmatic insistence that relations are secondary (and of the mistakes about perception which often follow) to admit that Hartshorne has a point and the “other view” is worth trying.

The claim that must now be made is a strong one. It is that anyone who accepts a categorical distinction between public and private and then tries to deal with humans collectively is grappling with an incoherent structure; they will be led into one of the strategies already encountered above—most often into some version of denying sensations their key role in human experience and intentional behaviour, or trying to explain these by devising a substratum for experience. A categorical distinction is betrayed by an implicit or explicit espousal of the idea that there may be anything in private experience that is incommunicable, where communication takes on a very general meaning which includes gesture, language and behaviour. The basic worry was expressed by Coady when he raised the spectre of an experience “cut completely loose” from

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40This is not to say that there are two separate stories here, one about culture and the other about biology. To take just two examples, lactose intolerance in different human populations is clearly relevant to food culture, and the exploitation of wheat as a staple crop can hardly be imagined without its remarkable evolutionary biology contributing to the story.

41Hartshorne (1934, p. 194).
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ordinarily we have little trouble in indicating and predicating the objects, situations, occasions and processes of our experience. Analysis of propositions containing fragments such as ‘the red teapot’, or ‘my cat jumped down’, might reveal hidden aspects deserving more attention, but their routine use in discourse is not often subject to blanket censure. Their appropriateness in a given context or the general value of the conceptual and theoretical frameworks embodied in them are starting positions to be moved out and on from, not assumptions to be dismissed.

This easy facility with words would not seem to extend from the specific factors we ordinarily deal with to fully general descriptions of experience as such. So far, all the distinctions that have been examined which make some
claim to general validity as predicates of experience have proved historically problematic, at least when viewed from an epistemological viewpoint. Anyone can of course say anything they like about experience; the question is whether what is said has any epistemic virtue, and hence practical value.

Since there are numerous distinctions which have been used with the aim of saying something general about experience and its objects,\footnote{Sensory–non-sensory, primary–secondary, appearance–reality, illusory–veridical, private–public, inherent–relative, subjective–objective, internal–external, active–passive, mediated–direct, immediate–inferred, innate–acquired, etc.} there is no question of dealing with them exhaustively here. However, the main conclusion which follows from our examination of the interdependent functioning of the senses can be summed up as follows: perceiving is not simply noticing and assembling data streams channelled to the perceiver separately by individual senses. On the contrary, it is a participatory interaction between a perceiving agent and a perceived object or event or situation. The extent to which the individual perceiver contributes anything to this interaction, rather than following the laws, habits and conventions which originate in physical, organic and social factors, is open to investigation. There is no reason to prejudice the inquiry by drawing a boundary around the individual perceiver and endowing them with a fixed set of sensory channels. Indeed, the extent to which an individual is responsible for perceiving is neither given nor necessarily amenable to analysis in terms of a unique, simple set of categories.

Keeping this in view, there are only two distinctions which cannot be left unexamined. The first is the distinction between public and private, and it is important because mistakes here threaten the cogency of any discussion of sensations and experience, i.e. just that which should serve as the foundation for any talk of the senses. The second is the distinction between subjective and objective, because the modern way of using these terms buttresses the mistake of pretending that the privacy of experience is absolute. Understanding what ‘subjective’ and ‘objective’ meant before the modern psychologism of absolute privacy became commonplace can also point the way out of the mire. These two distinctions will serve to show how far a re-examination of the senses might be able to take us.
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5.2.1 Private and Public

Reid’s epistemological scheme does not undermine the division between private sensations and public objects. On the contrary, his use of the distinction between primary and secondary qualities of objects requires it. But it is interesting that Reid also complains about the tendency to lose sight of the distinction between what it is to have an idea, or to experience a sensation, and the actual content of that idea or experience:

It is not the fault of [Locke] alone to have given too little attention to the distinction between the operations of the mind and the objects of those operations. Although this distinction be familiar to the vulgar, and found in the structure of all languages, Philosophers, when they speak of ideas, often confound the two together.45

It is not possible to have it both ways. As we have seen problems arise in Reid’s scheme once the primary–secondary distinction is examined. The gap between the private and the objectively real is always there for secondary qualities, and it gradually opens up between all conscious experience and the mathematical theories of physical science as these theories become more formal, abstract and exact. The closing of this gap must be sought in the other direction.

The privacy of our sensations of qualities and the consequent disappearance of qualities from the external world follows from asking for something which is entirely independent of the subject in the subject’s experience. It strikes me that putting the epistemological question in this way shows clearly that it is a false start, and the resulting puzzle can be resolved by instead asking just how perception depends on the subject, and thus making an attempt to overcome the relativity inherent in personal experience by delineating it, rather than trying to repudiate it. It then also needs to be noted that Reid’s stark division between private sensations thought of as existing only in the mind, and perceptions which are necessarily accompanied by beliefs of an object’s independent existence, cannot be strictly maintained. When I pay attention to my sensations, I perceive them and those sensations are, at least to some extent, objectified.

For Reid, a perception carries a significance which transcends our immediate experience. But this, surely, is true of all sensations. An immediate experience of a colour (not seen as belonging to a surface or indicating anything apart from itself) is significant in at least the minimal sense that the

subject is sensing red rather than green, and that the sensation can be classified in terms of parameters such as saturation, hue and brightness. None of these ‘laws of colour’ belong privately to any subject; all are as impersonal as any truth of mathematics or theorem of geometry. This applies equally well to those aspects of colour which evidently do depend on sense organs, and are in that limited sense clearly associated with a particular body, such as the after-images which follow from staring at high contrast pictures. These after-images are just as objective as any experience can be, and it is wrong to suggest by calling them private that they are in any sense unique to one person, or possibly different from those seen by anyone with normally functioning vision. There is actually no clear division between private, subjective sensations and public objects which are independent of an individual subject.

A further objective significance inherent in sensations can be gathered from their localisation. Reid points out that it is entirely unintelligible to say that an image is in the mind, but this applies to all sensations, not just those constituting images. Any sensation which is localised, and they all normally are, is perceived in space in exactly the same sense as physical objects are. Of course we recognise that many sensations belong to our body or our skin, but that makes them no less present ‘in the world’. Our perceived sensations are localised in space in just the same way as perceived rocks and trees are, unless a metaphysical principle such as the ontological self-sufficiency of rocks and trees is added to all the available data.

My foot is on the floor in precisely the same sense that the rug is on the floor, and the fact that I feel the floorboards whereas the rug (as far as we can tell) does not is completely irrelevant. Certainly sensations are often transitory or even fleeting phenomena, but so are clouds, rain showers, and rainbows. Although ‘in the mind’ is a much used philosophical vernacular,

\footnote{Reid (2000, p. 101). Also, cf. Reid (2002, p. 22): “It ought therefore to be remembered, that this distinction between things in the mind, and things external, is not meant to signify the place of the things we speak of, but their subject”. The word ‘image’ is far from univocal and its use here is in the context of awareness, not as it is used when speaking of photographs or paintings, i.e. when a physical reproduction is meant.}

\footnote{It should be evident that rocks and trees are ontologically self-sufficient only to those who confidently countenance lonely teapots in otherwise empty universes. Ontological self-sufficiency is normally reserved for substances, or the ultimate entities of atomists. It may be an idle wheel even in these contexts, although it has some heuristic value. Calling it heuristic points to its limits, and it is likely that starting with something like Boyle’s cosmical qualities is a far better strategy than starting with ontological self-sufficiency, at least if one wishes to remain open-minded enough to have some chance of discovering something fundamentally new.}
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this figural use of ‘inside’ which indicates privacy, and typically opposes ‘in the material world’, should not be confused with the perfectly literal ‘I feel a pain in my leg’ or ‘I see a mountain in the distance’.48

A great deal of confusion may be avoided by thinking of sensations not as in physical space, but, on the contrary, spatiality as inherent in the sensations. Even imagined sensations cannot be separated from locality as such, though these may to some extent be arbitrarily placed.49

5.2.1.1 Pragmatic Privacy

It was suggested in the discussion of agency in chapter 4 that the bodily senses, and particularly the sense of balance, are instrumental not only in allowing the expression of human agency through voluntary movement, but also in knowing oneself as an effective individual subject and being able to distinguish between oneself and anything else. A description of voluntary movement is by no means simple, however, and being able to reach out and grasp an object has more to do with the ability to turn the attention, formulate a clear intention, and direct the effort, than it has to do with kinematic descriptions of movement.50 Furthermore, in calling a movement voluntary there is no dividing line between what the agent is doing and what the body with its exquisitely tuned mechanisms achieves without the agent’s conscious knowledge or deliberate intervention. Studies of these mechanisms reveal layers of complexity undreamt of by the agent, and what this implies is that the movement and what the agent understands themselves to be doing are two quite different things.

This knowledge gap (sometimes glossed as a difference between knowing that and knowing how51) raises the basic problem of identifying human agency with the body which gives it objective expression. It is a familiar problem, closely related to discussing sensory processes and the objects of perception as

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48 These comments should be seen as generally consonant with the remarks by Bennett and Hacker (2003, sect. 3.8, pp. 94–97).

49 What is here said of spatiality also goes for temporality, and with that the possibilities of change and hence metamorphosis. Objects we normally call constant or persisting are only relatively so, unless one can somehow assign them infinite duration.

50 For a start, voluntary movement is never simply moving from a to b. Until specific movements turn into skills and habits they are tentative, awkward and require constant perceptual monitoring and corrective feedback. But even those movements which have been mastered, movements such as walking and sitting down, have this basic cybernetic character, as anyone with deteriorating peripheral vision will discover once they start inadvertently bumping into furniture.

51 Apposite remarks on this can be found in von Helmholtz (1968c, pp. 130–132).
if they were viewable from two separate perspectives: the first person, subjective, private view and the third person, objective view of what is public. What can be made of this distinction in light of what has been said about the senses so far is now considered briefly.

The simple idea behind comparing two perspectives, particularly the first person with the third person, is to separate out what it is in experience which is exclusive to one subject from what is the same for anyone, and this is clearly related to the distinction between private experience and publicly knowable objects, which can be based on the difference between what I personally see and feel and what everyone can see and feel, or more generally, can experience and know. It is often said, for example, that the way I know my private thoughts and feelings differs from how anyone else can know them. The same does not apply to cats and teapots since my knowledge of these things is not, at least in principle, any different to the knowledge that anyone else can have.\(^{52}\)

What is needed now is a clear distinction between the experiences of the subject, as the individual proceeds through the contingencies and accidents which befall them and follow from their decisions and intentions, that is all those occasions of experience which make up the sum total of the individual’s life on the one hand, and the content of those experiences, be they memories of childhood, interactions with cats, pains from scratches and so on, on the other. In some sense, the individual can be identified with the individual history of enjoyment and suffering, intention and action, but the division between this individuality and anything else cuts across the distinction between public and private, as it cuts across the related distinctions, including primary and secondary, subjective and objective, inner and outer, etc.

In the context of epistemological questions with some generality, what is at issue then in the public–private distinction, as well as the distinctions related to it, is not what is being experienced here and now by some particular individual. The issue concerns what in that individual’s experience is in principle unavailable to someone else. Putting this positively, the question is how the subject’s perceptual experience is unique; not as a consequence of bodily

\(^{52}\)These distinctions are not always drawn in precisely the same way, but a common theme underlying them all is the familiar difference between the world as it is and the world as I concretely know it. That there is a substantial difference hardly needs proving since I do not know everything there is to know about the world, but the way each one of us comes to know anything about the world conditions our knowledge in many more ways than simply making it incomplete. For a representative discussion of these issues see Nagel (1986), and the critical remarks in Malpas (1999).
organisation and previous stimulation—both of these being in principle and in all essentials available to other subjects—but as a result of some irreducible factor in the individual.

Whether or not there is some such irreducible factor—the essence of the individual person—is an interesting question, but what has so far been revealed about the senses indicates that it is not promising to search for any such individual character in sensory experience. In their bodily organisation and the functioning of their senses human beings are hardly more individual than peas in a pod. There may be significant differences between different cultures, but again the individual perceiver runs through the habits of a group rather than devising novel routines for themselves. Even if novelty is possible (as it must be if the sensory systems are truly plastic) then this is lost to the world unless the individual can share their discoveries and insights.

How is this sharing done? It can occur only among those with a common language sharing a living intimacy. One community member gestures to what is required for some experience, while the others mimic whatever actions and efforts are needed to suffer or enjoy it. The whole procedure relies on sameness, not difference, among the individuals concerned, and to the extent that people are physically, organically and psychologically similar, anything at all can be shared. Something like the experience of a colour can be shared as easily as looking in the same direction. Pains and emotions are more deeply conditioned by individual history and attitude, so sharing is not so trivial, but there is no reason to deny the possibility of two individuals growing so close that their experience is closely matched in certain situations.

What remains of the distinction between the private and public has little to do with epistemological principle. It remains useful as an arbitrary distinction, used to pragmatically separate what is easily shared from what is not worth the effort, or properly kept hidden from others. There may well be many such things within a culture and they may even include specific sensory experiences, but to call something like a sensation or an image ‘private’ in a theory of perception is to confuse perfectly proper cultural conventions with the inappropriate application of predicates to factors of experience. The first is harmless and useful. The second relies on a hard division between subjective experience and an extra-mental reality, and gives rise to all those puzzles con-

\[53\]In this context arbitrary means conventional and subject to change, in the same sense as Saussure called the association between a sign and its meaning arbitrary. See de Saussure (1983).
cerning the reality of colours, the logical possibility of substituting my green for your red, the senses of Martians, and so on.

These puzzles would be interesting if they did not rest on the confusion, complained of by Reid, between the “operations of the mind and the objects of those operations”. This is a confusion which we have sought to resolve by drawing the distinction between an individual life and the universal or at least general preconditions for living this life. Neglecting this easily slips into a tendency to remove the individual mind from the real world, and it is this which cements the basic incoherence of those epistemologies which start with a strong subjectivist division between ‘I’ and ‘world’, and thus get stuck with a need that is impossible to satisfy: validating experience by comparison to something ‘outside the mind’.

5.2.1.2 Signs in Public

We can now clear up a puzzle which may arise in the context of Reid’s epistemological scheme from mistaking the privacy of individual experience for some putative privacy of the content of our sensations. The former privacy results from the fact that I happen to be here looking in a particular direction and noticing and attending to those things which my culture has taught me to appreciate. The latter leads to the creation of theoretical entities such as qualia or other irreducibly individual aspects of an experience.

Reid did not, as far as I know, comment specifically on how private objects act as signs, except by invoking a God-given correlation. But the issue is important for any scheme which relies on the analogy between perception and reading in order to deal with the intentionality of sensations. This applies to all epistemologies which make use of the sign theory of perception and rely, in other words, on the trope of a Book of Nature.

It would seem that there is something peculiar about sensations, when they are called private and ‘internal to the mind’, acting as symbols or signs for real qualities or objects. The utility of a sign or symbol surely lies in its public nature, in that it is easily shared and displayed. Here it is good to remember that no sign or symbol can be any more public than a sensation. Once we compensate for the unavoidable relativity of living in an individual physical body with a personal history, everyone with healthy senses has sensations which are equivalent in every way that we can test for. Every other symbol, be it the

\[^{54}\text{Reid (2002, p. 136).}\]
spoken word, a written text, an artwork, or whatever, is mediated through our sensations. Hence one could hardly ask for something more ‘public’ than our sensations as far as their content is concerned. Of course to experience a sensation at any given time everyone must understand what they are looking for and attend to it in the relevant sense, but this is exactly what happens when someone sits down to read a book.

There is no need to accept, with Reid, any division between primary and secondary qualities which bears on what the objective world is like. Qualities can naturally be classified in whatever ways prove useful, but choosing to extract some out of the world and lock them up in the mind is informed by prejudices about the nature of reality. These same prejudices also motivate the assumption that our sensations are unlike the qualities they designate. If we cannot compare our sensations to those qualities that are hidden, we have no grounds for saying that they are similar or different.\(^{55}\) The same applies to comparing the sensations of two conscious subjects. Asking if my sensation of green feels the same as yours will only make sense if we can find a way to discover some differences.\(^ {56}\)

The distinction between public and private is just like the distinction between primary and secondary qualities in that it cannot be drawn in a principled way.\(^ {57}\) Generally speaking, it is tempting to make every bodily sensation, emotion and silent thought private, while sensory experience of the world outside the body is public.\(^ {58}\) This fails because the body is an object among other

\(^{55}\)Reid’s realism extends to qualities and this is quite different from positivism which might countenance the objective existence of no (sensible) qualities at all. Helmholtz, for example, was influenced by studies of the physiological aspects of the sense organs and Müller’s law of specific nerve energies which suggested to him that sensations of colour were generated in the brain. From this it is sometimes concluded that there is no real quality corresponding to our sensations of colour. The problems arising from these views will not be considered here, but further material can be found in Bennett and Hacker (2003).

\(^{56}\)Peirce explains that “had the light which, as things are, excites in us the sensation of blue, always excited the sensation of red, and vice versa, however great a difference that might have made in our feelings, it could have made none in the force of any argument”; Peirce (1958a, 5.467). But this only works if sensations are formally separated from the relations existing in the universe, ‘cut completely loose’ so they can be jumbled, and then returned to reality in purely external correlations. They would then be what Peirce calls “mere subjective feelings”. This does not work for something like hardness if ‘hard’ means “would resist a knife-edge”; Peirce (1958a, 5.467). Neither is there reason to believe that it would work if the qualities of sense are cosmical, to use Boyle’s terminology.

\(^{57}\)This is not to suggest that the same, or even corresponding, factors of experience fall on either side of the two distinctions.

\(^{58}\)This is clearly an oversimplification since how my body looks, for example, is public.
objects, and it is not separated from the rest of the world—all sensory experience relies on a body with a unique location which conditions all interactions with the environment, and is hence private in just the same sense as aches are. Conversely, unless an individual becomes sufficiently aloof not to share the joys and sorrows, stories and ideas which make a community, their emotions and thoughts are just as public as the smell of dinner.

Both ‘public’ and ‘private’ do no work and cause only epistemic disorientation unless we treat them as arbitrary designators pointing to social preferences and purposes, designators which each community applies as the context permits. There is no lawlike, consistent philosophical use of these terms. Everything in sensory experience is both private and public since it both belongs to a subject and concerns an object. Without both, it is simply not experience.

5.2.2 Subjective and Objective

Some of what has been said about ‘private’ and ‘public’ applies equally to ‘subjective’ and ‘objective’, but these terms are more interesting in that they point to an escape from the dilemma of having to call experience either this or that, and then struggling to draw a stable line so that neither the subject nor the object are sacrificed to theory.

The first step is to recall the fate of the objective world when sensations are made private. Unless an arbitrary division is made between primary and secondary qualities of objects, and a part of subjective experience rendered objective by decree, there is a danger that reality is drained of all qualities. This is already evident in Helmholtz. The persistent and apparently intractable problem which ensues is finding a satisfactory discourse which would enable us to compare appearances (or our representations) to the world as it really is, or to specific objects not as they relate to a subject but as they exist independently of all perceiving subjects. Unfortunately, as we continue to examine it more and more closely while working under this stipulated independence, objective reality disappears.

Keeping this in mind, it should be clear that we may well agree to call some property of an object such as a teapot ‘objective’, but consistency demands that we don’t lose sight of the fact that any knowledge of it has its source in the subjective experience of two or more subjects. Basing objectivity on such agreements does not yield strict objectivity according to some definitions, so it may be more proper to use some term such as ‘intersubjective’. As Donald
Davidson once put it: “The ultimate source (not ground) of objectivity is, in my opinion, intersubjectivity”.\(^5^9\) Intersubjectivity must be enough for human subjects, since it is all we have to work with.

Now from what has been said about privacy of experience in a social context, we can see that the existence of a common language within a living intimacy threatens to empty what is usually taken to be subjective and turn it all, at least in principle, into something intersubjectively knowable. The strictly subjective in sensory experience—that which must depend on one and only one individual—also disappears.

This is the obverse of what happened to the strictly objective. Both extremes have been emptied of content. All human sensory knowledge is social in the strict sense that in principle none of it is independent of all individuals, and none of it is restricted to one individual.

As before, the ultimate source of subjectivity is in the intersubjective, not just in the reverse-engineering sense that everything that is now subjective is potentially also intersubjective, but mostly in the genetic sense that almost all that is now personal was acquired from the intersubjective as the individual developed in learning and experience. For the possessors of language, the individual’s experience is informed largely by the way that testimony, coupled with imitation, directs the individual’s attention, and instructs the individual so that they can participate in the common form of life.

Consistency now demands that what is called subjective is recognised also as at the same time objective. This may seem terribly offensive to common sense, but any such offence arises from prejudices which insist on a categorical disjunction between subjectivity and the objective order.\(^6^0\) As we have been insisting throughout, the emotions, pains and desires which function as archetypes of subjectivity are no less real than cats and teapots, and they certainly transcend individual experience in their significance and effect.

Disagreement here has more to do with the use of words such as ‘physical’ and ‘real’, than it has to do with subjects and objects. To repeat: if the behaviour of pains was truly subjective in the strict sense, then there would be little point in discussing pain management strategies in public. If visible

\(^5^9\)Davidson (2001, p. 83). Davidson’s writings are an excellent source for explanations of why two or more subjects are needed.

\(^6^0\)Any mystery dissipates if we only accept that the terms are relational. Just as there is nothing strange in describing the teapot simultaneously as ‘behind’ and ‘in front of’ (two other objects), there is nothing wrong with calling a sensation subjective in how it relates to the subject and objective in how it relates to the cosmos.
after-images were truly subjective, then their lawful behaviour could not be investigated scientifically. Indeed, our perception of so-called secondary qualities is just as orderly as our perception of primary qualities, and knowledge of primary qualities such as shape, position and motion as perceived by vision, touch and the bodily senses is as prone to error, illusion and hallucination as any other sensory knowledge.

What remains to be done is to acknowledge explicitly that the subject and object are indissolubly tied together if these words are to be useful in an epistemological context. There is no need to be upset by the fact that the distinction is not disjunctive. All this can be understood if one gives up on a dualistic scheme of objects and subjects styled as utterly different entities and goes back to the original meanings of the terms, before these were masked by modern habits of usage.

The words ‘objective’ and ‘subjective’ have so far been used in their modern senses. This must be re-examined because the philosophical use of the terms ‘subjective’ and ‘objective’ has changed dramatically in modern times, especially during the eighteenth and nineteenth centuries, and the relation between them has been obscured. ‘Subjective’ as belonging to a subject used to signify something real, while something ‘objective’ was dependent on a perceiving subject. Nowadays, ‘objective’ is something real and independent of the subject, while ‘subjective’ is something personal, perhaps idiosyncratic.\footnote{This semantic shift and its significance have been discussed by Barfield (1984). See also the relevant entries in the Oxford English Dictionary.}

Compared to, for example, ‘inner’ and ‘outer’, which are clearly spatial figures, subject and object may sound simply technical, and indeed they are technical terms in scholastic philosophy. But like many technical terms they are dead metaphors. Both are spatial figures from Latin. The ‘-ject’ part means ‘to place’ and it is used in many terms such as project, inject, reject. Now the ‘sub’ in subject is ‘under’, so that to subject means to place under, and the subject is that which is placed under an authority or order within a cosmos or kingdom.

The object is then twice removed from primary being because it needs a subject in order to be. The ‘ob’ means ‘against’ and this quite literally makes the object something which is put against an existing subject in a primary opposition.\footnote{Also, an objection is what is put up against a positive thesis or proposition which is the subject under consideration. By saying positive thesis I am trying to keep explicit that any proposition assumes a language and a context, so it exists properly and necessarily under a structured whole.}
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There is another relevant spatial figure here in ‘substance’. In this case, ‘stance’ refers to standing or keeping equilibrium and orientation, maintaining some level of autonomy under a dynamic. The Greek term equivalent to the Latin is hypostasis, with ‘stasis’ again ‘stance’ and ‘hypo’ again under, as in inject with a hypodermic—‘under the skin’. The plain English term expressing the same basic figure is ‘understanding’. One might say that a knowing subject understands its proper place in the world order and the place of anything else.

What is neat about all these figures is that they point directly to agency, to autonomy and to the activity of keeping oriented and still. Without this incessant activity, for which, as we have seen, certain very specific senses are needed, the possibility of perception, which can be thought of as finding constants in a world of flux, is gone.63

These spatial figures indicate a fundamental structure. This structure is not dual, consisting of a perceiving subject and a perceived object, but triadic, since an ordered differentiation is necessary not only for the subject and object to interact—even for a subject to have a place in the cosmos—but for any object to be particular and hence be known as such. Emptying the particular, individual subject and object of inherent structure or essence does not of itself imply that they are superfluous, since the possibility of perceptive knowledge only arises between the perceiver and the perceived. This knowledge—or understanding—subsists in the relation arising from the presence of each participant in the context of a differentiated world. Without this differentiation and order, the incompleteness of knowledge loses its meaning, and it is debatable whether any significance can be attached to words such as ‘knowledge’ or ‘acquaintance’.

How ‘subjects’ are divided from ‘objects’ and how they are treated is again arbitrary, in that it is socially agreed and inconstant. The dividing line between me and the world is arbitrary in the sense that I must decide what I stand for, identify with, what it is that I take ownership of and responsibility for in the context of the purposes and processes that we collectively discover and invent. The sensible way to do this would seem to be to make the necessary choices in ways that enhance and develop personal well-being and experience. Of course we do not do this individually, we generally acquiesce to social norms

63What has been explained here is littered with spatial figures: pro-position, under-stand, etc. One could keep going with further attributes and abilities of a thinking subject: comprehend, attitude, intend, invent, and so on and so forth with place, position, orientation, effort and movement fleshing out all these figures.
and traditions, traditions which do not simply define us as the contents of our
skins, but tell us who we are and what is worth striving for.

While the traditions which evaluate behaviour and responsibility empha-
sise interdependence and involvement, evaluations of sense experience often
separate the world ‘out there’ from individual experience of it ‘in here’, cele-
brate a disinterested passivity, and even warn against sensuousness. But the
separation is not a given, it is a matter of certain choices which all newcom-
ers are invited or asked to share. And the passivity is an illusion founded on
neglecting to pay attention to the role we are playing.

5.3 Given Ineffable Riches

No matter which epistemological method or theory of perception is considered,
it is legitimate to ask what it advises and what that advice is good for. A great
deal depends on which distinctions are taken to be fundamental, what value
is placed upon them, and how they inform epistemic commitments.

The Galilean division of qualities, with the suggestion that the true and
universal language of the Book of Nature is composed of numbers and dia-
grams, advises measurement, calculation and geometrical rigour. The atom-
ism and determinism of the mechanical philosophy advise breaking things into
their constituents, and emphasise reproducibility at the expense of uniqueness.
Both projects aim at universal laws and rely on the dispensability of the indi-
vidual observer, rendering any acts of perception necessary in determining the
facts trivial in so far as this is possible. This is what is demanded in seeking
the observer independence required when we believe that what is true and
real is, in the modern sense, objective. The extent to which this advice can
really be followed need not be considered now, as long as it is realised that the
project is neither epistemically nor socially neutral.

The insistence in the last two chapters on the idea that our senses operate
in concert and in a social context, and that sensations are not atomic elements
of experience, has plenty to do with how we enjoy our daily rounds and how
we might arrange them to make perception both easier and more rewarding.
As Jennifer Ackerman tells it:

Sensing isn’t what we thought it was. It’s a far more sophisticated
endeavour shaped by our genetic makeup, our creative powers of fil-
tering and filling in—and, quite possibly, some significant crosstalk between the senses. […]  

What if we did process only one sense at a time, if you took in only the sight of your child’s face and not the timbre of her voice, or if you could only smell your morning juice but not see it? Would it taste the same? Probably not. What you see changes what you taste. […] Likewise, what you see affects what you hear and feel. […]  

So vision is never just seeing, touch is never just touch. We spot objects more easily if we hear a relevant sound simultaneously. When we see a banana or a crimson shirt, we’re also feeling it with our mind’s “hand”.  

The effectiveness (and, it might be added, pleasure) of a perceiving agent is enhanced rather than diminished by the richness of the stimulating environment, and putting a great emphasis on just one or two senses—seeing and hearing, for example—is unlikely to be the best way to proceed.  

Even if seeing is picked out for special emphasis by a culture, it is constituted by a complex set of skills which involve movement and attentive focus. Maintaining seeing skills and learning how to see better would then naturally flow on from an active exploration of a world not only rich in visual, but in all forms of stimulation. Paradoxically, this is not usually what is on offer in the modern built environment.  

If all that is now concluded amounts to something as commonplace, even trite, as the advice to turn off the television and take a walk in the woods, then it may be objected that one hardly needs an excursion into philosophy to see the sense in that. But the issue here is not whether the epistemic strategy which follows from a re-examination of sensory perception is startling and unexpected, or whether it merely confirms common sense. The more interesting point becomes clear when we look back the other way, at those efforts which equate what is ‘scientific’ with the elimination of subjectivity and cultured skill in perceiving. This is where the enormity of that project becomes apparent. The advice offered on the basis of those epistemological opinions certainly is startling and unexpected. The pinnacle of epistemic virtue in this context is to reduce the perceptive act to the lowest common denominator, to eliminate or at least neutralise the individual skill of the observer, and to base knowledge

\footnote{Ackerman (2007, pp. 25–26).}
on acts which satisfy what Colin McGinn calls, in a flourish which lands on the wrong side of self-contradiction, “an experience-independent criterion for whether the primary quality is instantiated”.

Whatever technical merits this strategy may have, it neglects and perhaps even undermines the multisensory competence which humans acquire as they grow. This competence is not acquired by associating data coming from separate channels (as atomistic prejudices counsel) but by discriminating within an inherently multimodal flow. Rivlin and Gravelle suggest, after explaining that the synaptic connections in the infant brain are formed by sensory experience, that

an infant [is] born into a Garden-of-Eden-like existence in which all things appear as one. Thus the infant, at birth, may be essentially synesthetic; that is, one sensory experience can trigger perception by another system, and the infant may see sounds as easily as it hears them.

Frustration of multisensory expectations such as the presentation of images which cannot be grasped, or the playing of sounds with spatially mismatched images, agitates infants. Remarkably, the unity of sensory experience apparently occurs even when the relevant sensory organ is non-functional:

What’s more, even blind babies up to a certain age turn their eyes and actually look at a source of sound at the same time they will try to grab it—again an indication that there is a major unity of sensory experience in the newborn.

It is not primarily through association but through discrimination that we acquire the perceptual and cognitive skills which develop further through language use and eventually into abstract thinking. Continued frustration or disappointment of sensory expectations results in atrophy of the relevant synaptic connections, and neglect of the sensory skills which do not contribute to the coherence of lived experience.

The adult brain is far less plastic than the infant’s, but loss due to neglect is noticed commonly enough to be enshrined in truism and cliché, and spectacular

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66 Rivlin and Gravelle (1984, p. 85). The evidence for infant synesthesia is rather stronger than these authors imply; see, for example, Maurer and Maurer (1988).
examples of the acquisition of new sensory skills are found even relatively late in life. Some of the most remarkable are achieved, as may be expected, through the necessity which follows injury and cognitive loss.\footnote{Astonishing examples can be found in the writings of Oliver Sacks. See particularly Sacks (1986), Sacks (1995), and Sacks (2005).}

Our direct participation in reality is facilitated by the senses. It is a mistake to think that their functioning is individual and independent. Treating them as such is more likely to damage than to enhance them, and even more likely to leave the perceiver with an increasingly impoverished grasp of what is real.

This is not too important, or not primarily important, for the enjoyment of sensual pleasure. But it is important when we come to deal with doubt and the failure of trust. It is even more important when our experience is transformed into a series of impressions, and the connectedness of all factors of experience is no longer recognised either intellectually or emotionally. If that is the cost of searching for truths ‘independent of the perceiver’, then we have struck a poor bargain with our senses, and it is wise to ask who benefits from this. A better way is indicated by Goethe:

> Man is sufficiently equipped for all truly earthly necessities if he trusts his senses and develops them in such a way that they go on being worthy of trust.\footnote{\textit{von Goethe} (1998, p. 151).}

That we must do something to perceive and that we must develop skills in order to perceive well is now clear, but making progress should not be reduced to blindly following a method or procedure based on prejudices about what is real. To make substantial progress, it would be better to take a hint from Boyle and accept that qualities are cosmical relations, and concrete, lived experience can yield much that has still gone unheeded. Real experience has an ineffable richness, and if we keep patiently returning to it in developing habits of perception and action, then the quality of individual experience—what Peirce called its quale—may truly be recognised as a realm of infinite possibility.
5.4 Summary

Advocating a return to the consideration of ordinary lived experience in efforts to individuate the senses runs up against a reluctance to give primacy to sensations in the work of a number of influential contributors to the recent philosophical work on the senses. The spectrum of opinion ranges from the advice to ignore sensations entirely through to efforts to quantify them, separate them from the problem of consciousness, or explain them by supposedly more fundamental processes or interactions.

The problem with sensations cannot be simply that there is some confusion about what the term ‘sensation’ and related terms such as ‘phenomenal feel’ mean. It may be true that the word ‘qualia’ is now tied to certain problematic theories of mind. However, the attraction of using ‘sensations’, the traditional philosophical expression used by Reid and his contemporaries, is that at least some of this confusion can be avoided, and what is intended can be sharpened by pointing to examples—such as the red of that teapot on the table—which can be expected to be familiar.

The real problem with placing the emphasis on experience, and hence elevating discriminated sensations to the primary role in distinguishing and enumerating the senses, is elsewhere. We have suggested that it lies in an incoherent application of the principles used to separate the perceiver from the perceived world. There are several such principles: the subjective Cartesian one between active ego and what appears to the ego as an objective other, the physical or physiological division between the perceiver’s nervous system and the mode of stimulation of the various sensory end organs, and the functioning of the organism expressed in how it uses its body to pursue goals and to meet its needs. To these three must be added, certainly for humans and probably for other social animals, the division between various social groups operating in diverse environments and sharing knowledge. This last is easily seen to be dominant for humans whose brains are plastic, who elaborate a grammatically complex language and a rich cultural life replete with ritualistic behaviour and dramatic modifications of the natural environment.

The unease connected to dealing with sensations can then be ascribed to the simultaneous adoption of incompatible criteria for how the relation between the individual perceiver and the environment should be conceived. In all but the Cartesian division, it is not only possible but likely that the individual perceiver plays a negligible role in routine acts of perceiving. They instead
follow the norms of the group, exploit the natural endowments common to
the species and are subject to the relevant physical constraints. Discussing
perception in a philosophical or scientific context must recognise this, but
this cannot be done while respecting the categorical distinctions which define
subjectivity as private, without descending into incoherence. Once this mistake
of using mismatched criteria is made, no effort to explain subjectivity or to
weep it under the carpet of a theoretical discourse is of any use.

Giving individual perceivers little say in how they see, hear, etc., is not
the same as claiming that the individual is unimportant or ineffective. On the
 contrary, without individual agency there is no perception, as we have already
seen in connection with the sense of balance. There is also the possibility that
the individual may discover something hitherto unknown and succeed in mak-
ing its significance known to others. All that follows from respecting different
principles of separation is that in any nomological account of perceiving it is
a mistake to call sensations private, as if two individuals were incapable of
sharing experience. It is undeniable that any discussion of the senses which
aspires to instruct a listener must be grounded in an intersubjective domain
and must assume the validity of sharing this. Fortunately, it is evident that
lived experience is a unity, and for humans at least, the expression of subjective
experience through meaningful action allows, at least in principle, any percep-
tual experience to be shared through imitation, language and the subsequent
development of skilled observation.

Privacy is therefore not a categorical property of sensations or of any com-
ponent of lived experience. There is of course the relative privacy of feelings
associated with the body, but here we must distinguish between an individual
life and what comes to meet the individual in the course of that life. Denying
the privacy of sensations is not a denial of the existence of individual per-
ceivers, merely the recognition that what is perceived here and now by one is
potentially perceivable by all.

The denial of the usefulness of ‘private’ as a predicate for feelings and sen-
sations is taken one step further by reconsidering the meanings of ‘subjective’
and ‘objective’. These terms have shifted radically in meaning and recalling
their older senses indicates a threefold structure in which the subject and ob-
ject always participate in an opposition. This can only take place within an
orderly framework or cosmos. Nothing needs thus be considered either subjec-
tive or objective in itself but everything is both, existing equally against and
for the perceiver in their activity of perceiving.
This insight is one expressed admirably by Goethe, complete with instructions on how to confirm its truth:

Nature has neither inner
Nor outer,
Being all at once.
Just check for yourself
If you are inner or outer.\(^{70}\)

In the last two chapters we have described some difficulties which get in the way of getting a fresh look at the individuation problem. Progress is hampered by a tendency to ignore the obvious: the primary role of direct sense experience. There must be good reasons for the refusal to follow this path, and in the next part some of these reasons are explored. They stem from a tendency to become obsessed by seeing, to the detriment of an unprejudiced consideration of the whole sensory range.

A strong separation between the world and the perceiver or, more exactly, a passive onlooker, can easily be mistaken for a common sense truth in the case of seeing, just as colour constancy can easily lead to the notion that objects have an inherent colouring. If these psychologistic starting points are admitted uncritically, and then seeing is considered exclusively, or even substituted for perceiving in philosophical discourse, the results are lamentable. Even after some of the important mistakes about seeing are overcome—as they have been, for example, in Noë’s enactive approach—problems which hinder progress in understanding remain. Among these are the concerns over the difference between how things look and how they really are, whether colours are real or merely in the mind, and how depth is seen. Taken together, these cases join with the observer relativities so clearly evident in the visible to advise a pervasive scepticism about what is seen.

Reid, our guide in so many important matters so far, was no sceptic. Still, he too was misled into worrying about some of the so-called problems of seeing.

\(^{70}\)This paraphrase does not seek to do justice to the poem, which reads: “Natur hat weder Kern Noch Schale, Alles ist sie mit einem Male. Dich prüfe du nur allermeist, Ob du Kern oder Schale seist”\(^{79}\). In using ‘inner’ and ‘outer’ the intention is to draw out the present relevance—Goethe was here concerned with the relationship between subject and object. Terms closer to ‘Kern’ and ‘Schale’ are ‘core’ and ‘husk’. For the complete poem, Allerdings: Dem Physiker, and a translation, see von Goethe (1983, pp. 236–237).
and offering novel solutions. These will prove instructive in showing that if one wishes to understand human perceptual abilities, then seeing is a rather poor starting point.
Part III

Is Seeing Typical of Perception?
Chapter 6

The Geometry of Vision

Three basic claims have been made in considering the traditional count of five senses. Firstly, that one should not look to Aristotle for an explanation of the count, even if his theoretical framework for perceiving remains attractive. Secondly, that the senses have been separated by distinguishing various sensations and feelings, with some attention paid to the association of sensations with sense organs. Thirdly, that a separation between the perceiver and the world has been used to determine what counts as a sense and what does not.

Individuating senses according to the varieties of sensation is not a mistake, at least not for the traditional five for which clear divisions in experience are difficult to deny. We have seen that if an effort is made to ignore or downplay these divisions as a consequence of theoretical prejudices, the traditional count becomes mysterious and fanciful explanations are offered. Some of these involve vague proprioceptive feelings, others cite cultural caprice even though the count is almost universal to humans, and there are even those who claim that the counting problem is uninteresting or irrelevant to making progress.

A critical consideration of the traditional count shows, however, that the separation of the perceiver from the world and the separation of the senses into independent faculties are mistaken. These separations are naive, i.e. pre-critical, and to understand them it is necessary to ask where they come from. In this part, it is suggested that a preoccupation with vision and its special problems is the source of the most important prejudices about how the senses function. It needs to be emphasised that these prejudices may be quite modern, since even medieval views on how the senses operate and are used do not fit well with them, but the historical story does not need to be told for us to see that in modern times perception is often styled as the passive reception
of readily available information, offered through separate ‘sensory channels’ or ‘modalities’ which can be used independently.

Vision is undoubtedly important. It allows us to seek distant goals and to quickly apprehend a vast sweep over the landscape of our environment. Among the variety of organic life, our visual acuity is astonishing, bettered only by “a handful of birds of prey”.\(^1\) All this has a profound influence on our form of life and on the quality of the experience we enjoy. We see quite directly how physically small each of us is, how vast the possibilities for movement are. We can see the stars. That is not to say that other life forms could not surmise the existence of stars and galaxies, their distances and sizes, but our vision is direct and all we need to do is open our eyes and look.

Vision is also a complicated matter. It is not just a play of contrasts between light and dark—things are coloured and there is a multitude of colours. Things also have shape and size and position, and we can see them move and change. Even better, we can recognise some individuals just by looking. Even better than that, we can recognise certain kinds of individuals, those important to us, despite the fact that they are changing, growing old or sustaining some damage or even falling apart. Is that not quite incredible?

None of this—except colour—is completely peculiar to vision. We can recognise other humans by their voice, and gauge the vastness of a valley or get a feel for the furnishings of a room by the quality of our own voice in it.\(^2\) But given the range of gifts from the senses, it is not surprising that there have been efforts to rank them, and sight has often been considered the most noble or quickest sense.\(^3\)

It is difficult to know what can be achieved by such efforts—they seem to be about comparing apples to oranges—unless we can relate the limits of our effectiveness to the ways specific senses facilitate the satisfaction of our needs. There is, however, an interesting characteristic peculiar to light and vision which has singled out this eye-sense as the most promising for scientific and philosophical investigation. This is the relevance of geometry.

\(^1\) Ings (2007, p. 126).

\(^2\) Rivlin and Gravelle note that “babies who are born blind from birth sometimes develop the [...] ability to echolocate. [...] Amazingly, it appears that all children are born with this ability”; Rivlin and Gravelle (1984, p. 77). Deliberate cultivation of echolocation in humans is mentioned by Carr (1972, pp. 117–119). Daniel Kish has recently developed echolocation techniques as an aid to the blind.

\(^3\) See, for example, Clark (2007b). Favouring vision goes under the ugly label of ‘ocular-centrism’ and its central metaphors have been attacked by philosophers such as Foucault, Lacan and Rorty.
Light normally has a source. Objects often throw shadows. Under favourable circumstances, edges are sharp and distinct. Everything is clear. Lines can be drawn, geometrical theorems proved and demonstrations given because visible light apparently travels in rays. Perspective is there to discover, and the behaviour of light rays when reflected or refracted provides opportunities for endless discovery and invention. There are the telescope, the microscope, but even earlier (and not requiring refraction) the looking glass, the camera obscura and the magic lantern. Newton’s experiments with prisms brought even colour under the umbrella of geometrical understanding.\footnote{Though not quite. It would be misleading to say that the prismatic colours exhaust the range of colour experience. Newton is usually credited with the metaphysical reductionism needed to equate colour of rays with their refrangibility, what would nowadays be expressed by saying something like ‘light is an electromagnetic wave’, but there is a lot more to colour than the spectrum of white light. For a start the rainbow may, under the right conditions, display a pink where the red arc should be, and brown can even sometimes be seen in a moonbow. Colour mixing and ambient illumination complicate matters tremendously. See Kuehni (2003) and Hardin (1988) for overviews.}

All of this is relevant to finding out how eyes work, and to the characteristics of the objects of vision. In contrast to the ready applicability of these scientific tools, mathematical treatment has only recently become relevant to the other senses. Sounds are like waves, they mingle and combine, they carry around corners and change depending on the movement of their source and what lies around it. An adequate mathematical treatment of waves is quite recent. The diffusion of odour also resists simple geometrical demonstration, and the sense of touch provides a bewildering array of sensations which even now resist efforts at quantification. So vision seems a good place to start investigating the senses scientifically.\footnote{Although geometry and mathematics were widely regarded as the acme of exactness and rigour, it is interesting to note that Boyle refused to express ‘Boyle’s Law’ in mathematical form in order to make it more accessible to public scrutiny and to avoid false impressions of certainty or universality. According to Shapin, “the scientific culture of the middle of the seventeenth century probably contained only three mathematically expressed laws of nature in terrestrial physics: the law of reflection (known in antiquity), Snell’s and Descartes’s law of refraction, and Galileo’s law of free fall. All of these were expressed in geometrical rather than algebraic form”; Shapin (1994, p. 323). Using geometry to explain vision would thus be seen—except perhaps by Boyle—as a great leap in understanding.}

There are dangers in this. The usual one is that we will adopt visual metaphors for everything that remains mysterious and eventually be beguiled by our own images as they harden into forms of speech and habits of thought. Another way of putting this is that assumptions which seem natural for seeing will be adopted uncritically for all forms of perceiving.
The most important visual metaphor now relevant is the idea that the mind is a camera, and, by extension, that perception amounts to recording or at least enjoying copies of what comes from the outer world.\textsuperscript{6} This is a form of representationalism and it looks good for vision. We each do have private copies of the visual field, one at the back of each eye. There are some problems with this: a minor one is that the copies are upside-down. More importantly, no one actually sees the little inverted images on the retinas at the back of each eye. What we actually see is something quite different.

The burden of this chapter is firstly to show that philosophical accounts of perception and its place in epistemology have been dominated by discussions of vision, and then that even vision was misconstrued as a process of interpreting a picture given to the spectator in the form of a ‘scene before the eyes’.\textsuperscript{7} To get started we need only consult Audi again:

We classify perceptual beliefs by the nature of their roots, not the color of their foliage. Those roots may be visual, auditory, and so forth for each perceptual mode. But vision and visual beliefs are an excellent basis for discussing perception and perceptual beliefs, and I will concentrate on them and mention the other senses only occasionally.\textsuperscript{8}

Some aspects of the classification of perceptual beliefs have already been looked at and the question of how this classification should be done can hardly be considered settled. Even a slight acquaintance with the counting problem shows that calling the roots of perceptual beliefs “visual, auditory, and so forth” is not a good option unless we are presenting naive views. However, as Audi admits he actually avoids the problem and, as will be shown, is quite typical in concentrating on vision. It will then be argued that if one is interested in the roots or sources of beliefs, then the idea that vision is an ‘excellent’ or even good basis for discussing these is quite wrong. Naive ideas about vision are among the very worst bases for a critical discussion of perception because vision is among the most complex of modalities, and common sense regarding

\textsuperscript{6}‘Outer’ is no metaphor for the camera, while ‘inner’ and ‘outer’ are (usually) figurative when applied to the mind and to perception. An earlier, closely related metaphor is that the mind is a mirror, and this eventually led to talking about reflection when we are thinking. The mirror was contrasted to the lamp. To appreciate how deep these metaphors go, see for example Abrams (1953).

\textsuperscript{7}The phrase is adapted from Lewis (1980).

\textsuperscript{8}Audi (1998, p. 14).
vision is saturated in prejudice. If we wish to discuss vision at all, it is prudent to seek the roots of vision first.

6.1 A Focus on Vision

An important example, already cited in section 2.2.3, of how seeing has been substituted without justification for perceiving occurs in Jackson’s *Perception*. This is not just a question of Jackson’s particular interest. It is a common feature of philosophical discussions of perception that they deal with seeing first and foremost, and most never get to anything else. When David Lewis, for example, applies his ideas on causation to perception, the result is an article on seeing.\(^9\) And when Barry Maund writes his *Perception* for a series which purports to deal with ‘the full breadth of philosophy’ he writes:

> I should acknowledge, before proceeding, a point that may be only too obvious. Although presenting a theory of perception, my discussion concentrates on visual perception. There are several reasons, some practical, for adopting this strategy. However, let me say that, while some philosophically significant features of visual perception will readily generalize, we should not assume that all will. I make no such assumption (and I do not totally ignore other sense-modalities). The extent to which the points do generalize will, I hope, be obvious enough.\(^10\)

It is difficult to gauge how obvious the extent of generality is if we are not equally well-acquainted with the character of each of our senses. Then again, if that acquaintance is adequate, there seems to be no reason, practical or any other, why a theory of perception should not be illustrated with or tested on all our sense modalities. Indeed, it is somewhat disquieting to suggest that the theory *may not* generalise. Should it not then be called a ‘theory of seeing?’

A similar focus on vision is evident in a recently published introduction to the philosophy of perception by William Fish.\(^11\) In the first footnote in the introduction, Fish mentions other senses, but then explains that “the majority of this book will follow philosophical tradition and focus on philosophical theories of *sight*, or visual perception”.\(^12\) Other senses (i.e. the other *four*) are

\(^9\)Lewis (1980).
\(^11\)Fish (2010).
\(^12\)Fish (2010, p. 9, n. 1), emphasis original.
discussed briefly only in the last chapter where some of the debate on individualization is introduced. What makes this instructive is that Fish has a considered position, and when starting on “touch, hearing, taste, and smell” he notes that “given that the majority of this book has been given over to discussing and evaluating theories of visual perception, we might think that we would be well placed to simply extrapolate theories of the nonvisual senses from these theories[; but] we need to consider what the other senses serve to make us aware of”.  

He concludes that “although the vast majority of philosophical work has focused on vision, there remains no widely accepted theory of sight. What is more, we have also seen that there are reasons to think that theories of the other senses may follow a different pattern”. To make matters worse, it seems that perhaps “a thorough philosophical understanding of our capacity to perceive the world will require a united theory of all our senses”.

The philosophical preoccupation with vision has not gone unnoticed. David Armstrong in discussing the use that Berkeley makes of touch in his theory of vision remarks that “subsequent philosophical discussions of perception have followed him in neglecting touch, and thinking almost exclusively about sight”. And Nicholas Wolterstorff, while searching for reasons why the representationalists following Locke’s ‘Way of Ideas’ failed to notice the absurdity of their position, is inclined to think that the major factor is “the habit of philosophers of concentrating on vision when developing theories of perception and offhandedly assuming that the other senses work pretty much the same way”.

Fairness demands an acknowledgement that there are limits to this preoccupation with vision. These limits can be encountered in at least two directions. There are those—Chisholm is an excellent example—who are really not interested in any specific sense at all, and the word ‘see’ can be replaced in formulaic fashion by ‘hear’, or the corresponding term from any other traditional sense in their theory of perception, as indeed Chisholm does explicitly in his *Perceiving*.

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13 Fish (2010, p. 157), emphasis original.
14 Fish (2010, p. 162), emphasis original.
15 Fish (2010, p. 162). Needless to say, the first step is to abandon the outworn tradition of five, which has no scientific or philosophical basis, and start laying the foundations for a coherent concept of a *sense*. Some steps along this path were attempted in the first two parts of this thesis.
16 Armstrong (1960, p. 73).
17 Yolton (1956).
19 Chisholm (1957, p. 149). For this to succeed the theory needs to be of such lofty generality that specific facts about individual senses remain irrelevant, and it is perhaps best
6.1. A FOCUS ON VISION

Going in the other direction, it would be foolish to claim that no one is interested in anything but vision. Even if authorities who neglect the other senses are collected together, presenting this consensus as a general preoccupation would remain a precarious induction and there certainly are important exceptions. Strawson discusses hearing, although Strawson’s comments on sounds have an unearthly strangeness. See Strawson (1959, ch. 2). Valuable contributions to questions specific to hearing have historically been made by Helmholtz, e.g. in von Helmholtz (1954). More recently Matthew Nudds and Casey O’Callaghan have offered interesting insights. See, for example, Nudds (2010b) and O’Callaghan (2010).

Armstrong considers bodily feelings, and an attempt to deal with the whole range of sense experience is made by Alston. Reid too is notably concerned with a great deal more than vision and that is a good reason for consulting his opinions.

The self-imposed restrictions highlighted here are by no means confined to recent philosophy—they pervade its history. Berkeley’s New Theory of Vision and Malebranche’s attack on the reliability of vision are notable older examples of a preoccupation with seeing. This is not to say, of course, that either Malebranche or Berkeley did not have good reason to deal specifically with vision; the first wished to undermine the reliability of perception by showing it lacking in the ‘noblest sense’, while the latter attempted to replace geometrical theories of vision, with their reliance on an objective spatial order, by an interpretative, semantic theory. Nevertheless, the general dominance of vision in the history of epistemology allows John W. Yolton to remark casually, at the beginning of his Perceptual Acquaintance, that “it is with the many accounts of seeing objects that this study is concerned”.

But my point is stronger than a simple complaint that the majority are talking about seeing; it is that seeing is a peculiarly problematic modality to deal with, and if one wishes to treat only or mainly seeing in a general account of perception, then one should justify the choice. As soon as any

to quietly let drop the question of how this squares with the counting problem. A closer look at Chisholm’s theory of perception, based as it is on ‘appearings’, leads to suspicions that it is yet another example of a theory of seeing, but to prove this would force an unnecessary digression.

20 Although Strawson’s comments on sounds have an unearthly strangeness. See Strawson (1959, ch. 2). Valuable contributions to questions specific to hearing have historically been made by Helmholtz, e.g. in von Helmholtz (1954). More recently Matthew Nudds and Casey O’Callaghan have offered interesting insights. See, for example, Nudds (2010b) and O’Callaghan (2010).

21 Armstrong (1962).


23 Pastore (1971, p. 41). Nicholas Pastore provides a useful overview of some of the historically prominent arguments concerning vision, including the ideas of Malebranche, Berkeley and Reid.


25 Yolton (1984, p. 4). It should be mentioned that even some psychologists tend to substitute vision for perception, as with Weintraub and Walker (1966) and Rock (1995).
of the details of seeing are considered the arguments become intricate, and touching and moving tend to creep into the discussion and generate further confusion.\textsuperscript{26} Offering general reassurances that seeing is an ‘excellent basis’ for philosophical theories of perception in place of an explanation of the choice is then evidence that something is amiss.

A focus on seeing would be of little consequence (apart from subtly restricting the meanings of words like ‘perception’ and ‘sense’) if it was not accompanied by some pernicious errors. The first of these is importing some of the properties of objects which are confined to their visible characteristics into reality as such, as if there was no need to investigate the whole variety of properties and qualities offered by sense perception, indeed to generally characterise the objects of perception, before forming definitive opinions about what is real. One consequence of this is that many physical and some metaphysical theories simply assume the existence of objects which are persistent and wholly separate, convincingly self-subsisting and possessed of a stubborn and quite definite ‘thereness’, just as they appear when we unthinkingly glance or stare at them.\textsuperscript{27}

The second error is neglecting the details of how seeing relates to the other senses, by adopting the tacit assumption that what is ordinarily called seeing can be understood without reference to the other senses. This assumption has already been shown to be questionable, and its relevance for understanding spatial relations in the visible will be explained in connection with a third error, which is the idea that perception relies on something being communicated to

\textsuperscript{26}As we have seen, touching is at least as troublesome as seeing, and motion is all too easily brought in abstractly without an adequate treatment of dynamics and agency.

\textsuperscript{27}The fact that these characteristics are not universal to visible things—belonging typically only to those solid objects which dominate some of our mundane concerns—need not be belaboured here. Atmospheric phenomena (including the blue sky), the moods of water surfaces in sunshine and breeze, and many other visible things have none or only some of these characteristics. Not even the wildest Humean imagination could sensibly claim the rainbow to be persistent and self-subsisting; its existence and location (as Lichtenberg noted) constitute a visible cipher to the perceiver. What can be gathered from this is that not only are many accounts of perception restricted to seeing, they are further restricted to the identification and observation of ‘well-behaved’ objects, such as cats and teapots. One might speculate whether there is an analogy here with starting an investigation into language by analysing the most trivial assertions possible and hoping that any theory developed on that basis will be adequate for all speech acts. John Ellis has argued that this has indeed been done, and that it mistakenly assumes something complex to be simple. See Ellis (1993). My comments here should be understood as a suggestion that an analogous mistake is being made when we start with the observation and recognition of individuals, and take these to be simple acts of seeing.
us from ‘outside’. Although the usage of the spatial term is often figurative and inconsistent, it prejudices our thinking of what a sense is and what is sensed. Vision is, obviously, a means of perceiving remote objects, but confusion over space and spatial relations is ubiquitous in discussions of seeing and from there it diffuses into other areas, often even resulting in the reification of information and meaning, so that nerves are said to carry information as if information was a kind of ethereal fluid.\textsuperscript{28}

There is also a fourth error, already noticed in the term ‘passive’. It is central to everything that follows. This error informs the naive approach to the psychology of seeing. This naive view has already been pointed to, but perhaps it is better to see how it is expressed by Simon Blackburn while he registers doubts about the coherence theory of truth:

\begin{quote}
Our judgement that a cat is in the garden is made true, if it is true, by the cat being in the garden. The issue of how other people would judge it is no part of this truth-condition. Nor is the question of whether the belief that it is would enter into any proposed system of belief. We don’t, as it were, look sideways, either to other people or to systems of belief. We look at the cat and look round the garden.\textsuperscript{29}
\end{quote}

Whatever merit this has in the context of theories of truth, it is a very clear statement of the error of thinking that the perceiver is passive in recognising objects, or even of thinking that it is the object which causes the perceiver to see it.\textsuperscript{30} We do not have to go too far to see the necessity to “look sideways […] to other people or to systems of belief” in perception. Swap the cat in the garden for a jaguar in the Amazon jungle, or an anaconda in the river, or even a spirit on the river bank, and that glance involved in routine looking becomes just one tiny detail in an infinitely complex web of causal relations, of cultural accomplishments and ecological exchanges. Unless we can learn to inhabit this new ecology, to put ourselves in a position to consult other people and their systems of belief, we fail to see.\textsuperscript{31} But travel to exotic environments

\begin{footnotesize}
\begin{enumerate}
\item Cf. note on page 15 above.
\item Blackburn (1984, pp. 245–246).
\item Or giving the perceiver’s (instrumentally utilised) senses the job: “We are good at cats because our senses make us causally receptive to their presence or absence”; Blackburn (1984, p. 244), emphasis original. At the very least, this separates the passive perceiver from the senses and their function.
\item These examples come from Everett’s remarkable accounts of linguistic explorations among the Pirahăns. See Everett (2008).
\end{enumerate}
\end{footnotesize}
is not necessary. We simply have to pick up a book on the history of seeing to realise how much social consultation and patient development of systems of belief goes into determining what can be seen and what cannot, which objects, apart from cats, we are good at noticing and recognising.\textsuperscript{32}

In looking at our familiar surroundings, it seems to us that we simply see. It is immediate, it is passive, it just happens.\textsuperscript{33}

Although both ‘passive’ and ‘immediate’ can be applied in technical senses which may make them useful in restricted contexts, the philosophical meaning of these terms, as with ‘sensation’, ‘representation’ or ‘qualia’, very much depends on underlying theoretical commitments. In connection with seeing, ‘passive’ and ‘immediate’ are two sides of the same coin, expressing the idea that the spectator does nothing (since there is no time for acting), and drawing attention to the feeling that in looking we play only an instrumental role, and visible objects are, as Berkeley expressed it, “not creatures of my will”. Taking the first step beyond this reveals the importance of attention and interpretation. If this step is too timid, and based on a desire to keep as much as possible separated from any effort or judgement on the part of the perceiver, then an entirely fictitious object is created and variously called ‘the visual field’, ‘the scene before the eyes’ or the ‘visible image’.

Treating vision as a separate faculty independent of the other senses is a failure to recognise essential sensory links, and to give the perceiver their due. In contrast, recognising the importance of the integration of vestibular and bodily information with the awareness of colour, suggests that what we see— including the orientation of objects, which are endowed with various spatial and kinetic properties—is brought into existence only with the active co-operation of the exploring perceiver. Still, since the perceiver’s instrumental contribution to what is actually seen changes the shapes and locations of everything seen, the pressing need to understand at least this aspect of perceiver relativity would seem to lead inevitably to starting with the spatially informative image as given, and then trying to explain how the \textit{movement and shifting viewpoint}

\textsuperscript{32}The historical arguments about what is real and what is not in the visible world are dealt with admirably in Clark (2007b).

\textsuperscript{33}There is a long tradition in philosophy which considers this attitude, a type of reliance on ‘the given’, to be a deficiency in empiricism. Philosophers working in this tradition, for example Kant, Sellars and McDowell, recognise that our conceptual apparatus or systems of belief affect our perception. The emphasis is on conceptual structure and representational content, and the senses are peripheral in the discussion. See, for example, McDowell (1996), and especially his treatment of secondary qualities.
of the spectator correlate with the shift from one image to another. The problem in this is that far too much is assumed to be given. It is as if the assumption was made by someone to whom detailed images appear as soon as they open their eyes, someone who already has well-developed habits of seeing, habits which they are no longer aware of having developed.

Once this mistake is made—and it must be repeated that it rests on a naive separation of the perceiver from what is perceived, as well as an erroneous separation of seeing from the other senses—then understanding seeing is falsely reduced to explaining how spatial information is extracted out of a two-dimensional manifold, and to puzzling over illusions which are, it would seem, presented to the innocent perceiver as if to deceive him. A concern with ‘appearances’ is yet another symptom of believing that the spectator is passive in the face of something presented ready made. Fretting over appearances and visual illusions is left to the next chapter, but the prevalence of the view that vision is a process of reading spatial relations and forms into pictures lacking depth must be looked at now. This view is mistaken, and even Reid made the mistake.

6.2 Reid’s Difficulties with Seeing

In dealing with all the senses, whether with five or with another count, one might ask for more than a formulaic word substitution in the style of Chisholm. The traditional approach is to propose a sensing process or mechanism and then show in detail how it specifically applies in the case of each sense. This is Aristotle’s approach in *On the Soul* and the approach of the followers of Democritus that he criticised.

Now going back to Reid is instructive because he is not only modern enough to be considering the problems which still exercise theorists working on perception today, he is also conscientious enough to be dealing with both the general theory and the specific facts relevant to validating it for each sense. He is, in other words, not content with an appeal to our naive ideas about seeing as if that could settle the matter.

The *Inquiry* is structured by treating the five traditional senses in Reid’s particular order of smelling, tasting, hearing, touching and seeing. It is fair to say that some of these senses receive only cursory treatment, and the work is really set up as a battle for primacy between sight and touch, those troublesome opponents for Aristotle and the Epicureans.
It is no accident that Reid has put those senses which acquaint us exclusively with secondary qualities first, and only then dealt with primary qualities. It is relatively easy to acknowledge that sensations of smell and taste are mere signs, existing in the mind but not in the world, though all the while corresponding to some actual properties of real objects, or at least caused in an orderly fashion by processes involving specific substances. The same move is far less intuitive in relation to the world of separate, physical objects taking up space in our field of vision. Surely, one may object, there is a clear resemblance in the shapes of things and their arrangement in the world, and their shapes and placement in an image or picture.

It must be said that Reid is characteristically ingenious on this. He insists, in all cases, “that none of our sensations are resemblances of any of the qualities of bodies”,\(^\text{34}\) however, while we are conscious and attend to the sensations corresponding to secondary qualities, this is not the case with primary qualities. When we perceive qualities such as hardness, extension and figure, we pass over our immediate sensations (which remain largely unconscious) and attend directly to the real qualities of bodies. It is in fact difficult, requiring “pains and practice”,\(^\text{35}\) to attend to the sensations which we use to perceive primary qualities.

In treating touching before seeing, Reid attempts to subvert some prejudices typical of an imagination dominated by vision. Both touch and vision give us access to certain primary qualities such as shape and size of physical objects, but they do so in entirely different ways. Touch is seen as primary and although, “of the faculties called the five senses, sight is without doubt the noblest”;\(^\text{36}\) Reid maintains that “there is very little of the knowledge acquired by sight, that may not be communicated to a man born blind”.\(^\text{37}\) In comparing the two senses, Reid deftly notes that the geometry of space that everyone learns in school is in fact a geometry of touch. The geometry of visible objects is different! And we have great trouble in actually attending to the image really before us. We all pass swiftly past the image which is taken merely as a sign of the actual figure of the object of perception. To put this crudely, the ellipse actually present in the image is seen as a circle, the quadrilateral is understood to really be square.

\(^{34}\)Reid (2000, title of ch. VI, sect. VI, p. 90).
\(^{35}\)Reid (2000, p. 64).
\(^{36}\)Reid (2000, p. 77), emphasis original.
\(^{37}\)Reid (2000, p. 78).
6.2. Reid’s Difficulties with Seeing

Ahead of some comments on Reid’s two geometries in the next section, it is worth considering that if we really paid attention to the image that we see, we might all be competent painters and draughtsmen. A natural talent for these arts could be thought of as largely an ability to pay close attention to the image. Those of us unable to draw or paint are simply distracted by the real objects in front of us, their actual colours rather than the dappled shades of immediate sensation, and the real shapes rather than the size perspective that is in the image. As Helmholtz put it in 1878, “As is well known, one of the greatest difficulties in drawing is being able to free oneself from the influence which the idea of the true size of a perceived object involuntarily has upon us”. On this view, all representational artists first have to learn to ignore the reality and paint the signs they sense, instead of the real objects they perceive. Is it not also astonishing how late is the discovery of the laws of perspective in representational art? So here again, we do not attend to the visible figures, which are unlike the real figures of objects, but use them merely as signs of their actual size, location, shape, and so on.

There still remains a nagging worry. Granted, the ellipse present in my field of vision which I identify as the rim of my cup is not exactly the same as the circle which is the actual figure of the rim, but it is quite like it in that it is easy to transform the shape into the true one. Surely the shape in the image resembles the true shape as much as or more than a pictogram or hieroglyph resembles the object whence it gets its shape, if not quite as much as the naturalistic landscape resembles the scene that the artist saw?

But this objection goes no further than reasserting a dominance of vision in our imaginative grasp of what the world is ‘really like’. Reid readily admits that:

There is certainly a resemblance, and a necessary connection, between the visible figure and magnitude of a body, and its real figure and magnitude; [. . . and] we can assign a reason why a circle placed obliquely to the eye, should appear in the form of an ellipse.

But, he swiftly notes that the visible figure is, to a sighted person, inseparable from sensations of colour, and that the matter is entirely different for one born

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39von Helmholtz (1971, p. 382). Reid also makes this general point: Reid (2000, pp. 97 & 102).
40Reid (2000, p. 95).
blind. In treating touch first, Reid has already shown that we can identify shapes by touch. Now there is no reason to say that ‘circularity’ is available in a privileged way to the one sense or the other. A blind person can identify circular objects just as readily as someone with normal senses. The key fact for Reid, now, is that when sight is restored to one born blind, they must touch the objects they are seeing for the first time so that they can identify their actual shapes and learn to read them from the visual image. Yet they surely know already what ‘circular’ or ‘square’ means.\footnote{Reid (2000, ch. VI, sect. II), and also von Helmholtz (1971, p. 382).}

It might be worth pursuing whether this is convincing or not, and whether it starts a slide into a positivism more typical of Helmholtz or even Mach, than it is of common sense—as was suggested with the primary-secondary distinction above. It would seem that a common sense view would have it that the shape accessible to touch is the same shape accessible to vision, albeit accessed differently, and it is a mistake to think that perceptual competitions between the blind, the sighted and those restored to sight can prove otherwise. But insisting on this is not the same as explaining just how we perceive shape in seeing or touching, and Reid’s insistence that as a primary quality of bodies shape must be perceived directly leads to trouble. The question of two geometries thus deserves closer scrutiny.

### 6.2.1 Multiplying Realities

Reid is recorded in the history of philosophy as the pre-eminent advocate of common sense. Arguments using appeals to common sense are delicate. Common sense is so easily swayed by the psychologism of familiarity and of feeling certain about all sorts of things, and by popular belief and popular myth. Reid’s epistemological scheme as it has been sketched so far is difficult to reconcile with the common sense of naive realism, if the realist is expected to take Reid’s duplication of perceptual qualities (sensations \textit{and} real properties or occult powers) at face value.

This unrestrained duplication of properties and qualities for the benefit of a theory is, however, not nearly as baffling to (my) common sense as is Reid’s treatment of the visual field. He proclaims that the geometry of the objects of vision has “entirely escaped the notice of mathematicians”,\footnote{Reid (2000, p. 102).} and that “while that figure and that extension which are objects of touch, have been tortured
ten thousand ways for twenty centuries, [...] not a single proposition do we find with regard to the figure and extension which are the immediate objects of sight!"  

There is something faintly puzzling about the whole episode in the *Inquiry* where Reid treats visibles, and it is not just the presence of a Rosicrucian informant with his tales about the Idomenians who see but cannot touch. There apparently are, depending on the sense involved, two entirely different ways in which ordinary physical objects are perceived to exist in space. The first is perceived by touch, and according to touch objects occupy the familiar three-dimensional space of Euclidean geometry. The second is perceived by sight. According to the testimony *of sight alone*, objects occupy a two-dimensional spherical space. We normally do not notice the difference between shapes in spherical space and those we inscribe on flat surfaces, because the fraction of the visual space that we take in at any one time is very small.

Norman Daniels has proposed that this discussion of the geometry of visual space, or the ‘geometry of visibles’, as it is called in the *Inquiry*, makes Reid an unacknowledged discoverer of a non-Euclidean geometry. However, exactly which position Reid occupies against the mathematicians remains a bit mysterious. It is curious that Reid would think that spherical geometry—which is what Reid’s geometry of visibles actually is—is something new. Daniels allows that spherical geometry was known in the eighteenth century, but his one terse footnote gives barely a hint of the depth of study devoted to spherical trigonometry, or the science of spherics as it was also known, by European explorers intent on navigation at sea, by medieval Arab scholars, by even the ancient Greeks and the Babylonians before them. This interest in spherical geometry is hardly surprising since astronomy cannot get started without it.

If Reid had realised that his geometry of the visibles was essentially the spherical trigonometry included in standard textbooks of his time, then he...
would have found that it too has been “tortured ten thousand ways” by the mathematicians. But Daniels offers an answer to these misgivings. Reid is a little unclear on how he thinks his geometry relates to spherical geometry. He says that the sphere is merely a model of the geometry he has in mind.\textsuperscript{49} His main contribution, according to Daniels, is to propose visible relations not simply as relations confined to a spherical surface existing really in traditional, three-dimensional Euclidian space, but existing separately in a different kind of space which is properly described by what we might nowadays call elliptical geometry.

It is not at all clear that this solves the historical problem since non-Euclidean geometries were developed by starting from the axiom of parallels, whereas Reid discusses merely the spherical geometry in which any two straight lines (geodesics, or great circles on the surface of a sphere) intersect in exactly two points.\textsuperscript{50} It remains nevertheless possible to claim that Reid’s important contribution is to realise that the geometry applicable to physical objects is not a matter of \textit{a priori} definition but a matter for empirical study, and in this his attitude may anticipate what Gauss, for example, thought.\textsuperscript{51} Yet even if it is agreed that the geometry of space is to be determined in the light of perceptual experience, then Reid goes one step further: the \textit{immediate} objects of touch and sight exist in different spaces! This is not the same as saying that physical objects have a double existence, merely that in addition to these there are other, more mysterious objects which God has deigned suitable for inspection by spectators.

There is something metaphysically daring, even exciting, in this proposal of a variety in spatial existences. With the modern proliferation of exotic

\textsuperscript{49}In the same way perhaps as spherical geometry is a model of modern Riemannian geometry. Daniels (1989, p. 8).

\textsuperscript{50}It is possible to develop a geometry without being specific about parallels. Classical projective geometry which is relevant to some of the problems of perspective can be developed this way. It can also be obtained by identifying the antipodes of a spherical geometry with infinite radius, but again this is not the procedure that Reid adopts and his axioms do not yield a projective geometry. The debate over Reid’s geometry of visibles has been considered in detail by Giovanni Grandi who draws on manuscript evidence regarding the parallel postulate to conclude that Reid’s ideas should not be identified with what later became non-Euclidean geometry. The geometry of visibles is non-Euclidean only because its axioms are necessarily different from Euclidean plane geometry, but “the geometry of visibles is the same as the geometry of the surface of the sphere, described without reference to points outside the surface itself”; Grandi (2005, p. 101).

\textsuperscript{51}Gauss kept his knowledge private because he was averse to public dispute. See Bonola (1955) for details.
geometries, one can imagine that once we accept enough geometrical com-
plexity, room could be found in heaven and earth for the coexistence of not
just three-dimensional teapots and multidimensional superstrings, but also for
Idomenians and perhaps even for angels. There is no eternal truth in saying
that space is Euclidian or that one geometry must describe everything that
exists—or that all objects must share the same kind of space. But it seems
to me that Reid’s motivation for insisting that this two-dimensional space of
the visual field is just as objective as the three-dimensional space of touch is
largely an effort to avoid Berkeley’s immaterialism. Reid’s account of visual
space has as little to do with common sense as Berkeley’s account of solid
objects. Most people do not trouble themselves about visual space beyond
assuming that the red teapot that is seen is the same teapot—same shape,
size and location—that is touched.

The purpose behind this excursion has not been to expose a blind spot
in Reid’s knowledge of the history of mathematics, or to undermine his epis-
temological scheme. The real purpose is to ask what can be learned from
Reid’s daring move. When the astute philosopher proposes a thesis easily as
contentious and offensive to common sense as any defended by one of his in-
genious opponents (Descartes, Malebranche, Berkeley or Hume), then we can
be sure an important problem is nearby. The problem of extension and form
and the way that it manifests very differently for each of the traditional senses
is the mystery that Reid is grappling with, and we will see that his failure to
solve it is unimportant in comparison to the value of his ideas for forging a
way ahead.

It is not easy to decide what one should make of the flourish with which
the geometry of visibles is introduced in the Inquiry. Could the whole episode
be a subtly ironic attack on Berkeley? By the time Reid published his Essays
on the Intellectual Powers of Man the comments on visual and tactile spaces
are muted:

The rules of perspective, and of the projection of the sphere, which
is a branch of perspective, are demonstrable. They suppose the
existence of external objects, which have a tangible extension and
figure; and, upon that supposition, they demonstrate what must
be the visible extension and figure of such objects, when placed in
such a position, and at such a distance.
CHAPTER 6. THE GEOMETRY OF VISION

Hence it is evident, that the visible figure and extension of objects is so far from being incompatible with the tangible, that the first is a necessary consequence from the last, in beings that see as we do. The correspondence between them is not arbitrary, like that between words and the thing they signify, as BERKELEY thought.\(^5^2\)

No fanfare at the expense of mathematicians here, but the insistence that “in the visible, we find two dimensions only; in the tangible three”\(^5^3\) is retained. It remains to be seen what the limits of correspondence between the visible and tangible are, and if there is any room left for arbitrariness.

Seeing clearly causes Reid a great deal of trouble, and more than half of his Inquiry is devoted to the problems of vision and his attempts to fit the badly behaved visibles into a neat epistemological scheme.\(^5^4\) Since the philosophical tradition betrays a one-eyed preoccupation with seeing distance, additional comments on this are needed.

6.2.2 Peering into Space

The prevailing picture of the eye as a camera derailed Reid’s robust common sense. Although he was well aware of bodily sensations and even notes that they have a role in looking, yet he still missed the significance of this when contrasting sight to hearing and smell:

> There are three of our senses which give us intelligence of things at a distance: smell, hearing, and sight. In smelling, and in hearing, we have a sensation or impression upon the mind, which, by our constitution, we conceive to be a sign of something external: but the position of this external thing, with regard to the organ of sense, is not presented to the mind along with the sensation. When I hear the sound of a coach, I could not, previous to experience, determine whether the sounding body was above or below, to the right hand or to the left. So that the sensation suggests to me some external object as the cause or occasion of it; but it suggests not the position of that object, whether it lies in this direction or in

\(^{5^2}\)Reid (2002, p. 225), capitalisation original.

\(^{5^3}\)Reid (2002, p. 224).

\(^{5^4}\)For a detailed explanation for why visibles are ‘badly behaved’ in this context see Wolterstorff (2001, ch. VI).
6.2. REID’S DIFFICULTIES WITH SEEING

that. The same thing may be said with regard to smelling. But the case is quite different with regard to seeing. When I see an object, the appearance which the colour of it makes, may be called the *sensation*, which suggests to me some external thing as its cause; but it suggests likewise the individual direction and position of this cause with regard to the eye. I know it is precisely in such a direction, and in no other. At the same time I am not conscious of any thing that can be called *sensation*, but the sensation of colour. The position of the coloured thing is no sensation, but it is by the laws of my constitution presented to the mind along with the colour, without any additional sensation.\(^55\)

This passage is instructive in that it displays a separation that Reid requires for his epistemological scheme. This is a separation of what is seen into two: a sensation of colour which is “presented to the mind along with” the position of the coloured object. This sensation is not, however, any experience. It is a theoretical object which has been called an iconic sensation above, and which both Peirce and Whitehead called an abstraction. There are no experiential grounds for lawfully separating colour from location in this way, except those demanded by a particular theory of spatial perception. But once we understand how spatial perception follows from embodiment, the contrast Reid needs here between seeing and the other traditional senses disappears.\(^56\) Although locating objects by hearing may not be as accurate or reliable as doing it with sight—at least for those of the sighted who enjoy normal vision and don’t pay close attention to sounds—in both cases we estimate the position of objects, and doing so visually for distant objects is limited by the need to resolve the ambiguities between distance and size without significant motion parallax.

In considering only smell, hearing and sight, the implication in ‘distance’ is *great distance* since “intelligence of things at a distance” is obtained primarily by reaching out and touching them. So if we are to limit the count of senses as Reid does, we would have to talk only of things that *remain* at a distance, things that we are not allowed to touch and grasp, to move to or travel to, as

\(^{55}\text{Reid (2000, p. 99), emphasis original.}\)

\(^{56}\text{As Noë explains, this does not mean that there are no differences between the sensorimotor skills brought to bear on perceiving with the several modalities. It means only that sensorimotor skills play into all of them. Perceiving direction and location thus belong to seeing because what is called seeing here is not a separate sense. See Noë (2004).}\)
babies are naturally wont to do. This is picturing perception as passive and ignoring exploration in the gathering of any “intelligence of things”. Further, we need only replace ‘sight’ by ‘looking’ to realise that, previous to experience, we can no more locate objects by sight than by hearing or smelling.

Finally, the only reason that Reid is not conscious of any sensations but colour when he sees an object placed in space is because he has defined sensation to suit his scheme, and is not even paying attention to his bodily sensations which he needs to determine how his body is poised, his head turned and his gaze directed.

There should be no need to go into any more detail on how what is ordinarily called seeing (even the seemingly effortless way we see a cat that just happened to jump on the table and upset the teacup) is a learned activity, how it involves multiple senses, and what a false picture we have of it when we believe that all there is to it is opening the eyes, turning the head and paying attention.

Several points, however, require re-emphasis. Firstly, once we understand the role of the vestibular apparatus in giving us a dynamic participation in the world, we can see that it is a mistake to treat touching and seeing separately, as if spatial relations entered differently into these modalities. There is only one world and all our senses are operational in it. Secondly, it is not our body we perceive (as if it was a lump of matter floating in some abstract void) but the whole physical universe which our body is an interacting part of. Thirdly, we perceive all the dynamical variables of physical theory just as we perceive anything else, and as we perceive them they are necessarily relational and cosmical. Asking for a perceptual determination of a force without active exertion on our part is like attempting to weigh something with only one half of the balance. This does not mean that what we perceive is not objective, only that it is dependent on the presence and activity of the perceiver, no matter how passive they feel in this act.

6.3 The Original Visibles

Reid’s concern with a geometry of visibles stems from a concern with the original objects of vision which are, in his view, presented to the mind with some spatial information included. This spatial information, like the extension presented to touch, concerns primary qualities and is therefore perceived directly. The arguments address concerns raised by Berkeley in his famous New Theory
of Vision, in which he argued that depth is interpreted in the visual field, and that touch provides the primary data needed to learn how to do this.

With all the advances in understanding vision between Reid’s time and ours, it may well be asked whether the important questions in those old debates—particularly on the nature of the immediate objects of sight and the absence of distance (depth) in them—are still relevant. There is certainly no shortage of philosophers currently engaging with the relevant arguments. But that itself does not show if they are of more than historical interest, so we also need to confirm that these questions are still seen as central.

The key questions are, firstly, whether the current debate remains focused on explaining how a manifold of given, or at least pre-existing, visible data is apprehended as a space populated by solid objects, with some occluding others and all hiding their backs from direct inspection, and secondly, whether the role the perceiver plays in interpreting the given manifold is still a matter of contention. If the debate has not advanced much past these two issues, then the core of the problem as it was present to Reid and Berkeley remains unsolved.

It is best to make a stepwise approach, keeping the goal always clearly ahead. This goal is to clarify, or at least try to clarify what a visual manifold could possibly be, and what it is that the perceiver must do in order to use it in seeing the world. The first step is to show that it is not enough to deny that the eye is literally a camera. Although such a denial eliminates the need for a complete picture to be presented for inspection to the mind, and hence avoids the most crass versions of the homunculus fallacy, it leaves room for more abstract objects which play an analogous role. The second step is to avoid the trap of separating inference from action, since doing this merely moves the problem instead of clearing it away. The third step is to confirm that the way is clear by noticing that the picture or visual manifold never existed in the first place. It was an artefact of trying to deal with vision as if it was a separate sense belonging to a single subject.

The history of the theories of vision is a vast panorama of intricate arguments, ideas, experiments, and reports. There is no question of doing it justice in a few pages, so the intention here is only to pause at some of the main signposts on the path, and ask informed contributors for advice. That the eye is like a camera and that we must make judgements to use it effectively is a very old idea.\textsuperscript{57} The first big step to a more sophisticated view is to say that it is a rather bad camera.

\textsuperscript{57}See for example Park (1997, p. 84).
6.3.1 The Missing Information

At the start of this chapter there was a brief paean to vision. Those comments were not quite as elevated as those of Helmholtz on the eye, who once wrote of the “choicest gift of Nature—the most marvellous product of her plastic force”, a “crowning instance of perfection in an organism”, and an “unsurpassed model” for opticians. He noted that:

It is by the eye alone that we know the countless shining worlds that fill immeasurable space, the distant landscapes of our own earth, with all the varieties of sunlight that reveal them, the wealth of form and colour among flowers, the strong and happy life that moves in animals.\textsuperscript{58}

Examined a little more critically, the human eye reveals so many apparent imperfections that Helmholtz himself remarked that “if an optician wanted to sell me an instrument which had all these defects, I should think myself quite justified in blaming his carelessness in the strongest terms”.\textsuperscript{59} Indeed, the human eye has only a tiny spot of high acuity, peripheral vision which works for movement but is otherwise uselessly blurred and lacks colour definition, an area of significant size where we are blind, a lens which introduces easily perceptible chromatic aberration, a structure which results in astigmatism and other problems, its retinal “light-sensing photoreceptor cells are located on the wrong side—turned away from the eye lens”,\textsuperscript{60} and its dynamic range (although impressive) is obtained at the expense of colour at low intensity.\textsuperscript{61}

But these features appear as imperfections only in the context of preconceptions which have distracted so many from understanding the actual way that we see. The ruling idea was that the eye is a camera which takes snapshots of ‘the scene before the eyes’, and that these snapshots are conveyed via nerve highways to the brain to be inspected, classified and filed there. This picture of vision as a process of taking pictures is excusable if seeing is first divided into passive seeing and active looking, and then the passive process assumed to be the primary one, but that does not stand up to scrutiny. It is

\textsuperscript{58}von Helmholtz (1968a, pp. 63–64).

\textsuperscript{59}von Helmholtz (1968a, p. 75).

\textsuperscript{60}Guck (2009, p. 33) and Hardin (1988, pp. 12–13). As Guck explains, the natural engineering solution to this problem is nothing short of astonishing.

\textsuperscript{61}Not all eyes are the same and some kinds of eyes do not share the specific imperfections of the human one. See Ings (2007).
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the kind of simple mistake made by someone acting out routines so carelessly that they no longer pay attention or even notice what they are doing in the performance of the relevant skill. Sooner or later the truth will out: perhaps when the body is damaged and a skill has to be relearned, or perhaps when it comes to our notice that the picture of seeing as passive photo taking keeps giving birth to the same theoretical impasse over and over.

The picturing model of perception tends to assume that “as an optical instrument, the eye is a camera obscura”\(^{62}\) and in this context all the complaints that it is a very bad camera seem justified. Gibson disagrees with the “widespread impression that the eye is a poor optical instrument”\(^{63}\) but his comments do not undermine the fact that as a camera the eye is, as Helmholtz discovered, a careless piece of work indeed. The point is that no evaluation of ‘good’ and ‘bad’ is worth anything if we are not explicit about the purpose which the instrument is to serve. The eye is primarily neither a measuring nor a recording instrument for lengths, and its imperfections as such are only clues on the path to a better understanding of how vision actually works.

Once it is mooted that the eye is a defective camera the question arises how we compensate for its imperfections, since the usual subjective impression is that we are blessed with a coloured, sharp, detailed and, given the limitations of a point of view, complete view of the world. It is indeed this phenomenal richness that promotes the idea of picture taking in the first place, and the only problem that seems urgent is that the world is seen only from one angle at a time, so that only those surfaces which face us are visible, and only two dimensions worth of data are contained in it. But depth is not the only data that is missing. For a start there is the notorious blind spot. Not only is all visual data missing at that spot, our awareness that it is missing has also vanished! There is also an almost complete loss of detail outside the central foveal region, and so little known subjectively about the limits of view that we are not even aware (visually) whether there may be an edge there or if the light just fades away.\(^{64}\)

There is now the double problem of determining, firstly, how good the picture conveyed to the waiting brain is (i.e. what data is collected through the transduction of light into nerve impulses by the retina—hence the preoccupa-

\(^{62}\)von Helmholtz (1968a, p. 65).
\(^{63}\)Gibson (1950, p. 116).
\(^{64}\)For the basics regarding vision, see for example Goldstein (2007), and for the philosophical aspects, see Noë (2004).
tion with the retinal image), and secondly, how the information is extracted from it. That these two are the important problems has hardly been doubted. As Noë puts it:

Something like the snapshot conception provides the starting point for much empirical work on vision. The basic problem that vision science faces (at least as it has been conceived over the last century and a half) is that of explaining how it is that we can enjoy [. . . a] richly detailed, high-resolution visual experience, when our actual perceptual contact with the world, in the form of the stimulation of the retina, is so limited.\footnote{Noë (2004, pp. 35–36). This is sometimes called the ‘poverty of stimulus’ problem. Noë provides an excellent overview of recent moves in the philosophical debates, as well as introductory descriptions of the main phenomena, such as change blindness, informing these debates. As we have already seen, Noë’s aim is to overturn the snapshot paradigm, or at least supplement it with a recognition of the importance of the perceiver’s \textit{physical activity}. For quite a different take on what are some of the more important problems of vision science, see Changizi (2009).}

Guided by the impression that our view of the world is richly informative, we tend to make the basic mistake noticed by Peirce:

It appears to me that many writers think, or have influential vestiges of having formerly thought, that we have before us at each moment something far more detailed and determinate than any picture, and also think that all we are in any sense aware of is somehow in that image.\footnote{Peirce (1958a, 8.280).}

The insight here goes very deep, but before its full force is felt we need to check what fixing the flaws of the eye means.

\section*{6.3.2 Thinking and Doing}

Consideration of the blind spot led Helmholtz to propose that apart from any deliberate judgements we may make of a scene, there are also unconscious inferences from the raw data. We are not aware of ‘filling in’ the blind spot, and special tricks are needed to become aware of its existence. The mind must therefore be somehow dealing with the problem, most simply by extrapolating from current knowledge and so papering over the hole using colours and patterns adjacent to it.\footnote{von Helmholtz (1968c).}
Helmholtz was by no means the first to propose the problematic notion of unconscious mental functioning, or an important role for judgement and inference in seeing. As Schwartz tells it:

Does perception depend on inference? The question is a very old one, which does not seem to want to go away. One might reasonably have expected that advances in visual science would have resolved the issue by now; but the dispute is still very much alive. Such relentless persistence of the problem, in spite of developed sophistication in our understanding of vision, suggests that something is askew. And I certainly think that something is askew. Indeed, I think that the problem of perceptual inference has evolved in such a way that there cannot be a single proper answer to the question.68

The solution Schwartz offers is rather deflationary. He notes that “the claim that vision involves inference gets its life from the idea that what goes on in vision is in some ways analogous to what goes on in intellectual or conscious inferential reasoning”,69 and then suggests that playing analogies in this way has, in this particular case, “outlived its usefulness”.70 Fortunately, he does not stop at the advice to simply let the problem drop:

My suggestion, then, is to dissolve the problem of visual inference, rather than attempt to resolve it. Unfortunately, as with many an unworthy human pursuit, merely being told to give up on a problem will not make it go away. Exorcism often requires uncovering the underlying causes that make the issue, even if illusory, seem so pressing. [...] There is a] potent assumption that provides much of the impetus for pursuing the question of inference and trying to come up with a definitive answer. [...] It is the conviction that something in vision must be given, what the world presents or foists upon our senses.71

Schwartz then says that the “various accounts differ only over where to draw the line between the world’s contribution and our own”, but there is “no principled, unequivocal way to make this decision” about “what is given and what

68 Schwartz (1994, p. 84), emphasis original.
71 Schwartz (1994, p. 116), emphasis original.
lies beyond” because “the notion of what ‘we supplement’, like the notion of the ‘given’, is not fixed and varies with theoretical projects and interests”. He declines “to take sides here on any of these perplexing epistemological and meta-theoretical issues”.

But we have already come across this type of problem! Is this not similar to the situation encountered with ‘public’ and ‘private’, where we found that sensations were potentially and actually both, and if a separation was to be made then it would need to be arbitrary, based on the relevant interests? The present predicament seems to be somewhat different, in that a mainly theoretical distinction is operating. Calling feelings private and properties such as redness public is a perfectly ordinary way of dealing with aspects of experience, but the objects of vision seem to always be just given—they appear or present themselves—and it is itself an inference that something in the visible is inferred. Finding a way through the difficulties which Schwartz diagnoses so clearly may thus call for a solution more radical than admitting simply that the line between the given and inferred is arbitrary. A more structural step is needed, and perhaps it is to recognise that what we are dealing with in vision is, actually in each specific case, both given and inferred.

There is more to the disputes than differences over where the line between the given and our contribution should be drawn. As Schwartz notes, one of the main problems is agreeing on what ‘inference’ is. The key step to overcoming this hurdle is not to get distracted by restrictive notions of inference as syllogistic, formal reasoning. Noë’s contribution is invaluable here since instead of talking about inference, reasoning, data processing or even neural computation, he wisely examines the perceiver’s doing and so brings out the importance of skilled exploration in ordinary seeing. On important points he takes issue with those inferentialists who conceive the process as some kind of calculus of propositional knowledge or symbolic computation. He concludes, however, by pointing out that the exploratory activity underlying the whole enactive approach is a form of thinking. Of course, if they are to count as actions and skills rather than ‘mere behaviour’, then the movements must be informed by a purpose and explicable by reasons; to be, in other words, intelligible in a strong sense. This version of intelligibility is one in which we are not merely asking that something be explicable by some mechanism or

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72 Schwartz (1994, p. 118), emphasis original.
process, but requiring that the actions be informed by inferences regarding the possibilities on offer, and of the effects that the movements, counted among the most important contributing causes, will produce. In other words, perceivers “exhibit not merely skillful mastery of the ways sensory stimulation varies as they move, but also expectations about the effect of movements on their access to the environment”. 75

It is now not too far-fetched to suggest that displayed here is the larger concept of inference that was always required to understand seeing properly. Moreover, with this larger concept of inference in view we can highlight the fact that every form of thinking, be it exploratory action or dealing with propositions, takes time. In this process, what we begin with is always taken as given, since it is already there on the table, as it were. To accept or even regard it as given, however, says nothing substantial about where it came from, and there is no reason to insist that what now feels to be factual and independent of our (present) efforts was not just a moment ago brought into existence with our participation and involvement.

 Adopting the larger, more inclusive notion of inference that is needed to understand perceiving is what was meant by the enigmatic phrase that we must ‘avoid the trap of separating inference from action’ in our second step. Before we move to the third step to see that the visual manifold is a fictitious object, at least a pointer to how we are to understand this concept of inference is called for.

As it happens, the basic idea has already been elaborated in great detail by one of the most significant contributors to the recent developments in logic and the philosophy of science, Peirce, when he developed the basis of his epistemology. In addition to his other achievements, Peirce should perhaps be counted among the most important contributors to our understanding of perception—he never tired of using perceptual processes as examples in his arguments, he performed relevant experimental studies, and his sign theory is explicitly formulated to unite formal reasoning, linguistic expression, and perceiving. While the kind of schematic sign theory of perception adopted by Berkeley, Reid, Helmholtz and many others can be seen as relying on the trope of a Book of Nature, with Peirce we have now available a framework in which it is clear that the comparison is no mere analogy. The sign is the basic tool of understanding and without it we not only cannot think and reason, we cannot act or understand anything, or see.

75Noë (2004, p. 66).
Peirce develops the fundamental ideas for his epistemology in a series of early papers, particularly “Questions Concerning Certain Faculties Claimed for Man” and “Some Consequences of Four Incapacities”. If our goal now was to understand how perceptual knowledge relates to propositional knowledge, and what the wider implications for epistemology and theory of mind are, then we would be obliged to pay close attention to these, and it would be interesting to explore how the threefold structure of subject, object and cosmos suggested for perceiving in the last chapter ties into Peirce’s categories of firstness, secondness and thirdness. But the more modest concern here is only to say that a consideration of human seeing is a difficult place from which to embark on a study of perceiving. It is thus enough to check what Peirce took inference to be. In his illuminating study, William Davis puts it this way:

Peirce’s essays have as their main purpose the proof that all cognitions whatever are inferential in nature and not immediate and intuitive. All thought is in process; it requires time and is continuous.

When Peirce speaks of an “inference”, he means any cognitive activity whatever, not merely conscious abstract thought. Specifically, he includes perceptual knowledge and even subconscious mental activity.

But it must be realised that thinking for Peirce is not at all the individual pursuit of what might disparagingly be called a Cartesian ego, and he took himself to be advocating a theory of direct perception. In a letter to William James he professes agreement with Reid and Aristotle among others on this, and then tells James that “you can’t find a place where I distinguish the objective and subjective sides of things”. We have already seen that if the terms are used in the modern manner, then trying to apply this distinction leads to nothing but trouble.

### 6.3.3 Images and Sensations

The third and last step now is to throw away the data array on which our seeing is supposed to depend. This step is needed mainly because clinging
6.3. THE ORIGINAL VISIBLES

to that manifold, or laying too much emphasis on the retinal image, leads to
to errors in thinking about the experience of seeing, and these in turn motivate
some sceptical worries that will be dealt with in the next chapter.

That the assumption of the existence of some such manifold is tempting,
has already been confirmed by Reid’s concerns with the geometry of visibles,
but even someone as iconoclastic as Gibson also felt it necessary to talk about
an ‘ambient optic array’, and it is a popular idea that since one of Berkeley’s
main arguments in his essay on vision was to prove that we learn to see depth
in the visual field, he must have thought that the original object of sight was
a flat, two-dimensional picture. But Berkeley did not make the mistake of
taking the original objects of vision to be two-dimensional: “planes are no more
the immediate object of sight than solids”. Still, his use of tactile distance as
an immediate object of perception, which we use to interpret the visual field,
only points to the need to examine what ‘immediate’ could possibly mean for
touch.

80Gibson believed that this array is pre-existing to any act of perception, and information
in it is picked up by organs tuned appropriately by evolution. He did not think that we
start with a picture: “The notion that [animals and babies] are born with depthless visual
sensations to which the third dimension is added by any operation, learned or unlearned,
now seems to me quite ridiculous”; Reed and Jones (1982, p. 20), emphasis original.

81See Schwartz (1994, p. 27). The term ‘original’ here is not the same as ‘given’ since
original means what is given to perceivers before any perceptual learning begins, whereas
what is felt to be given at any moment could well be the result of acquired habits followed
without deliberation or attention. So the Berkeleian view may be parodied by saying that
although outness—Berkeley’s term for depth—may seem given so that objects just appear
as distant from the eye, this is a ‘projection’ achieved by learned habit utilising sensations
of touch.

82Berkeley (1975, p. 54). See also Schwartz (1994, p. 27). Logically, if Berkeley wished to
prove that we do not immediately see three dimensions, then it is sufficient to prove that
the step from two to three is interpretation, but the full claim that the immediate objects
of vision are not extended is stronger. Armstrong simply cannot countenance this, so he
charitably interprets Berkeley’s view to be compatible with a “two-dimensional manifold”;
Armstrong (1960, p. 6). I have been suggesting that Reid’s similar view is absurd. There
seems to me to be no way to slot a geometrically two-dimensional object into a higher
dimensional real world or, as an alternative, to call our experiences extended. These are the
Scylla and Charybdis for theories of seeing based on pictures. Reid opts for an extended
visible figure but excuses himself from assigning it a place in the categories of existence;
Reid (2000, p. 98). See also Wolterstorff (2001, ch. 6).

83Armstrong is quite right when he says that:

Berkeley gives little consideration to the question of the nature of touch. For
him it is simply a deus ex machina which yields the perception of distance,
and of three-dimensional objects, which sight has failed to give. He makes no
attempt to discuss in any detail the nature of tactual experience. (If he had
In order to clarify this matter we will have to make a rather strong distinction between a ‘picture’ and an ‘image’. A picture is a physical artefact such as a painting or a photograph. It is of course a three-dimensional object but usually flat enough for its front surface to approximate a plane representation of something. If it is a landscape done in realistic (figurative) style, then it is possible—provided that one stands still and can for a moment suspend disbelief—to suffer what is called a window illusion in front of the painting. Its frame seems to be the frame of a window looking out on the outside world. Gibson has pointed out that it is actually pretty hard to sustain the window illusion, and this is no less true for photographs or movies because the perspective, contrast, and colour never match normal vision, and the pictures never behave correctly when we move our head. But there is one example where the window illusion works very well; when the window is a mirror. We see impossible objects in the mirror (the enantiomorphic twins of real objects) and with a vertical plane mirror sometimes the only way to check what is real is to try to reach into the looking glass world. Touching the glass is not needed to break the illusion—it is broken when you see the left-handed counterpart of your right hand moving magically in the mirror just as you are moving it.

So far all these illusions are not necessarily distorted, or otherwise obviously imperfect, versions of objects which we know to be different from how they appear. The rationale for calling these examples illusions comes from seeing two-dimensional pictures and taking them for three-dimensional objects, which is the mistake of identifying a representation with the reality. There is no depth in pictures and when we look at a picture and believe that we are looking at truly three-dimensional objects then we are clearly suffering from an illusion.

undertaken such a discussion it would almost certainly have shown him some of the difficulties of his position.) Armstrong (1960, p. 73), emphasis original.

However, the idea that treating touch would help is not new and Reid among others sought to analyse touch as carefully as vision. As we saw in the last part, this is of little use unless the importance of agency and dynamics is recognised. If it is, then Samuel Johnson’s famous refutation of Berkeley is not as crude as it might seem.

A television screen is also a picture while it is on and what is at the back of the eye is also a picture. It is best to say explicitly that the picture on the retina is not what we actually see; if that was the case then our vision (except for one direction) would be terribly blurred and we would be aware of the blind spot.

Gibson (1971).

This window illusion in front of a mirror—and the question of which axis is actually reversed in a plane mirror, since it cannot possibly be two directions—is profitably studied by watching the mirror scene in the Marx brothers film _Duck Soup._
Now an *image*—as distinguished from a picture—is what we see when we look and are conscious of some or all of what occupies the visual field. The visual field, or, synonymously, the scene we are facing or the arrangement of visible objects, is what is usually supposed to be available for inspection at our leisure simply by looking; this is poorly defined since it depends on attention, on observation skills, on how good our eyes are and so on, but defining it more precisely is not necessary. The word ‘image’ is used routinely in optics where real and virtual images are formed by systems of lenses (and recorded on film or by various sensors), but it is better to restrict its meaning here to the *conscious image*. In this case it is not appropriate to talk about the window illusion because that would render all seeing illusory, but the geometric model of the eye and all physical theories of light advise us that the image seen with one eye lacks depth, just as all pictures do. Seeing depth is then supposedly a trick done by fusing two slightly misaligned images and by using various other clues such as shape and size distortion (perspective), fuzziness, atmospheric haze, shading, the context of familiar objects, etc. The point is that visual depth is a matter of interpretation and inference, even when it feels immediate.

But the presence of all those other so-called visual illusions, such as the Müller-Lyer illusion, the moon illusion, and a host of others, shows that shape, size, and length are just as inferred in an image as depth is. This highlights a contrast between pictures and images. Pictures are physical objects with real length and width and negligible depth. Images are nothing of the kind. They do not exist in space at all. Although it is routine to assert that objects in images have shapes and (relative) sizes and positions, it is wrong to say that an image as such has any shape or size; length and size comparisons make sense only *within* images, and there is no means of taking a conscious image and comparing its width or height to that of a picture! An image is arguably not three-dimensional, but neither is it two-dimensional or any dimensional.

What kind of a thing is it then that has here been called an image? It is something we have already come across and called a complex sensation while discussing balance. For seeing, it is a synthesised body of located, changing, distributed colours. It is just as inappropriate to call it extended, as it is to

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87 The term ‘sensory core’ has been used by Hatfield and Epstein (1979), but the theories they discuss are already committed to the mistake I am challenging.

88 An excellent discussion can be found in Changizi (2009).

89 See Ross and Plug (2002); it is telling that the moon illusion—the moon or sun appear significantly larger on the horizon than high above—is an illusion generated by observer posture and familiarity of context.
insist that it is absolutely private or unreliably subjective—it is a sensation. It is, to put it simply, a component of ordinary experience relying, as they all do, on multiple sense modalities and having no necessary connection to an individual mind.

What we see is the result of intelligent explorations using several sense modalities, most importantly our eyes and our sense of balance which is the gateway to the kinetic and spatial information that we rely on so heavily in seeing. The problem of reading depth into pictures was always a mere distraction if the goal was to understand what is ordinarily called seeing, because there is a much more fundamental problem, pointed out by Peirce after he noted the prevailing view that the seen third dimension is known only by inference:

A similar argument may be urged in reference to the perception of two dimensions of space. This appears to be an immediate intuition. But if we were to see immediately an extended surface, our retinas must be spread out in an extended surface. Instead of that, the retina consists of innumerable needles pointing towards the light, [...] The excitation of a nerve does not of itself inform us where the extremity of it is situated. [...] It is not conceivable that the momentary excitation of a single nerve should give the sensation of space. Therefore, the momentary excitation of all the nerve-points of the retina cannot, immediately or mediately, produce the sensation of space.\(^{90}\)

Here is Reid’s *experimentum crucis* transposed from touch to vision,\(^{91}\) but Peirce understands how to resolve it since he recognises the importance of voluntary, thoughtful movement and exploration informed by memory and expectation. There is no need to rehearse Peirce’s reasoning in detail; it is not in any case exclusive to him. It is also how Helmholtz saw it, explaining that

\[90\] Peirce (1958a, 5.223), emphasis original.
\[91\] See page 143 above.
\[92\] von Helmholtz (1968c, p. 124).
\[93\] von Helmholtz (1968c, p. 127).
Immediately following the second quotation is a remarkable passage on how infants learn to see objects. This echoes, almost uncannily, Reid’s famous comments from the *Inquiry* on acquired perception in children. Had Reid really allowed his pained subject the freedom to move and explore, he too could have eventually fathomed the shape of his own body and even the figure of a pin. But to understand this truly one first needs to have directed effort and this is simply not possible without the sense of balance, which Reid came to understand admirably, but perhaps too late.

If the image presented to vision is taken to be something extended and containing detail readily available for inspection, then it is perhaps best to throw that idea out with other misleading fabrications and say with Peirce:

> I will now go so far as to say that we have no images even in actual perception. [...] If, then, we have a picture before us when we see, it is one constructed by the mind at the suggestion of previous sensations.

The problem in starting any inquiry into perception by considering seeing is that the folk psychology is all wrong. Seeing feels largely passive (except for the instrumental shifting of the gaze) but the picture we believe we see to be so steady and persistent incorporates recent memory and anticipates the future. Its details are largely virtual and their continuing existence is only available piecemeal for confirmation. These details certainly feel like they are not ‘objects of my will’, but this is the way that the effects of all the habits of a lifetime feel unless a determined effort is made to try to change them. This felt effortlessness in seeing is so closely analogous to our mastery of balance that it has even been suggested, using the same faulty folk psychology, that “we do not do anything to gain vestibular information”. However, while a little thought and attention quickly reveal how wrong this is in connection with balance, no amount of book knowledge of the mechanisms of seeing or determined staring at the teapot on the table will convince us that that self-sufficient red object requires our continuing efforts to look the way it does. Only the kind of experimental investigations pursued by Helmholtz with himself as subject, for example, show the relevant facts directly enough.

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94Reid (2000, p. 201).
95Peirce (1958a, 5.303). This use of ‘image’ and ‘picture’ is the inverse of the way I have defined them.
97See von Helmholtz (1968c).
Investigating seeing in more depth eventually reveals the key role of balance and agency in this remarkable ‘sense’ and allows us to see the naive views on seeing as a predominantly passive process for what they are. Unfortunately this understanding has, historically, come too late to prevent the key mistakes from being absorbed into philosophical theories of perception and into epistemology, where some of them remain firmly entrenched.

It may be said that all this talk of inference and construction by the subject of what is seen opens the way to sceptical views about what we can know about the world. The next chapter aims to show that telling such a story would misrepresent the perceiver’s real situation. It is not properly understanding the perceiver’s active role in seeing that generates sceptical worries. It is precisely the feeling that “the world presents or foists upon our senses”, combined with superficial thinking about the role of the individual and the meaning of what are usually called illusions of the senses, that can descend into puzzling over appearances and how they might relate to the truth. If this leads to efforts to get at something ‘more real’ than the phenomena, and a preoccupation not just with the reliability of the senses, but also with a global justification of sensory knowledge, then something as natural as ordinary perceiving starts to look like something which we should worry about, or even try to substitute with more rigorous epistemic strategies.

### 6.4 Summary

Seeing has not only been considered one of our most valuable and informative senses, the relevance of geometry to the manipulation and explication of images makes it an attractive modality for scientific investigation. The simplest hypothesis is that the eye acts like a camera, taking snapshots which the perceiver enjoys, inspects and classifies.

We have shown that seeing is often singled out in philosophical accounts of perception, as if it was typical, or as if examples taken from seeing are adequate in a more general context. The dangers in this procedure are that assumptions which seem natural for seeing are generalised for all perceiving. The worst of these assumptions arise from the subjective passivity of seeing objects and their superficial separateness—since solid objects usually appear persistent and clearly delineated. Added to this are the assumptions that

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seeing is a separate channel for gathering intelligence—perhaps because it is so easily turned on and off by moving the eyelids, while the rest of the sensorium remains activated—and that the use and control of this channel is the business of the individual perceiver.

Treating seeing as a separate sense, in particular separate from touching, led Reid into formidable difficulties. Some of these are directly related to his insistence that primary qualities such as extension are perceived directly, and this implied to him that we are given two kinds of extension: one visible and the other tactile. Together with the picturing model based on the anatomy of the eye, this suggests that it is worthwhile to relate a hypothetical geometry of vision to the usual Euclidean geometry of touch. Reid pursued this in earnest, but underlying the whole effort is the assumption that there is a principled division between what information is given to the perceiver, and what information the perceiver ultimately learns to extract from what is presented by acquiring habits in learning. Reid had to go even further in his account of seeing, and separate the sensation of colour from the perception of the location of the object, since in his scheme extension is a primary quality and hence unlike any sensation.

Arguments over where the line between the given and the perceiver’s contribution should be drawn have dominated discussions of seeing in philosophy. The matter is complicated by disagreements over what form or function the perceiver’s contributions may have, but the dominant theme is that a two-dimensional image presented to the perceiver, indeed two such images, are somehow analysed and interpreted.

There are three steps needed to go beyond these faulty opinions. The first is to realise that there is a tremendous gap between what is seen—the detailed view of the world we seem to enjoy—and the information supplied through the ‘imperfect’ eye organ. This implies that despite any subjective impression, the perceiver must do a great deal to see what they see. The second step is to recognise that much of the disputing over what interpretation takes place is based on restricted notions of inference as a process of symbolic manipulation. Drawing on the insights of Noë, Helmholtz and Peirce allows us to acknowledge that the perceiver’s physical activity (intentional, voluntary movement) is constitutive of seeing. The process is best understood by using an extended conception of inference, which unifies thinking and doing.

Helmholtz clearly explained that both of these rely on the agent’s previous knowledge, and although they are spoken of differently—as kennen and wissen
in German, or ‘knowing that’ and ‘knowing how’ in English—they unite in perceiving.\footnote{\textit{There appears to me to be in reality only a superficial difference between the ‘conclusions’ of logicians and those inductive conclusions of which we recognise the result in the conceptions we gain of the outer world through our sensations’}; von Helmholtz (1968c, pp. 130–131).} The third step is to recognise that what is seen at any moment is not a two-dimensional image but a complex sensation, selected for attention out of the entire flow of lived experience.

The role of the perceiver in constructing what is seen implies that the object of what we call seeing is an amalgam of acquired perceptions requiring several organs, chiefly the eyes and the vestibular apparatus, which are integrated by the active perceiver to serve our visual apprehension of spatial and kinetic relations. The relevance of agency, considered superficially, suggests that this should lead to scepticism since we do not see ‘what is really there’ but rely largely on our habits and expectations. This thinking is misguided since scepticism is the result not of a clear understanding of the socially cultured skill of seeing, but of combining the naive notion that the perceiver is passive with a reaction of puzzled annoyance to what are called visual illusions or unusual phenomena. This combination would seem to demonstrate that the senses are unreliable, and the appearances deceptive.

Since this flawed understanding of the so-called ‘illusions of the senses’ has been so important in epistemology, these so-called illusions need to be looked at in the next chapter.
Chapter 7
Deceptive Realities

In drawing attention to the importance of a spherical geometry for seeing, Reid pointed to important facts concerning how shape, volume and distance in ordinary three-dimensional space are linked to the point-like perspective of a located perceiver. The relations between shapes in a geometry of visibles, and shapes in ordinary Euclidean geometry, are not to be disputed, but Reid also felt the need to grant perceivers an original apprehension of visible extension. It is difficult to say definitively whether this is a mistake, and what spatial content, if any, is available ‘originally’ in vision. It is clear, however, that the detailed pictures of the world which we take for granted in ordinary seeing are the fruits of learning while doing. The eye might be better thought of as a roving, exploring beam than as a camera taking snapshots for subsequent interpretation.

There is, nevertheless, something appealing to the idea that all one has to do is look and then whatever is there simply appears. It certainly seems this way with familiar objects such as teapots and cats. Seeing these usually comes with an almost irresistible feeling that these things are there in some sense despite me, and my looking has nothing to do with them. This last point—that my looking lacks consequence, or that it is an act transparent or empty in relation to the resulting perception—seems to go without saying in much of the philosophical literature on perception, since the way I have been using ‘look’ is generally not discussed. It’s the other ‘looks’, as in ‘it looks like a ginger cat’, which monopolises attention.

To explain how ‘looks’ in the sense of only ‘looks or appears to me’ gets its importance in philosophy, and why talk of ‘appearances’ can be deeply misleading, we need to re-emphasise that an activity of looking is inseparable
from any seeing, even though in directing attention to the visible objects we often neglect noticing our own role. One crucial aspect of this is to stay constantly aware of how important our own motion is.

In all the sophistication of geometrical approaches to vision a vital point is lost: the central role of motion. The story being told in the picture-taking approach to seeing starts from the wrong end, analysing still images first and then adding these together to animate the scene with various translations. This is as if we were all watching a movie of reality, contrived for us as a grand illusion effected by the flashing of images so rapidly that we do not notice them individually. Geometry is not particularly good for motion because movement—even in the movies—has its own phenomena of blurring, colour mixing and shape distortion. What use would geometrical precision be if we blurred all the lines and distorted the shapes?

Although geometry is unpromising as an approach to the phenomenology of motion, there is no reason to believe that our eyes are not good at detecting movement directly. All we have to let go of is the simplistic idea that individual rods and cones collect data on light intensity and pass it on for processing to the brain. Looked at more carefully, the light sensitive cells are used in complex combinations to detect patterns and motions, and much of the work is done before the brain is even ‘notified’. Visual motion detection is actually rather good, even in peripheral vision, and if it is true that making concerted efforts and integrating bodily movements with the changing play of colour eventually yields the beautifully clear images we see, then geometry is useful chiefly in discussing a finished product, not the process of achieving it.

Two important issues arise in this connection. Firstly, if clarity of delineation is achieved after considerable effort, then we cannot necessarily be expected to be naturally good at reading two-dimensional pictures and, secondly, if motion is important in seeing, then the judgements which our acquired perceptions of visible objects are based on will not prioritise only shape, size and position, but motion as well.

Once these issues are understood we have everything needed to understand the phenomena which are often called visual illusions, and to see them in a new light. They are not illusions at all, but decisions made on how best to see what we, collectively and as a species, want to see. While there are good reasons why things look as they do to the modern human subject, there is little in the way of a cosmic necessity in this, so to elevate a few puzzling phenomena into a doctrine of appearances with sceptical overtones is almost certainly a mistake.
This suggestion will be fleshed out in a couple of simple steps, starting with the confirmation that ‘looks’ in the sense of ‘appears’ dominates in discussions that express sceptical worries, then finishing by drawing attention to the arguments intended to motivate the distinction between how things appear and how they are, and pointing out how dire these turn out to be on examination. There is a distinction between how things appear in a photorealistic picture and how they are. To relate these all one needs is the laws of perspective. But these laws are not sufficient if one wishes to relate what is perceived by sight to what is perceived by touch. The intelligence supplied by these traditional modalities requires the perceiver to think and to estimate, to prioritise and to judge. What perceivers obtain in doing this are not the dead, abstract figures of geometry. They get what they need to live.

7.1 The Primacy of Effort

The discussion of Reid’s ideas on visible figure in the last chapter did not bring out one specific problem clearly enough. What is, to Reid, a visible figure? It is a representation:

A projection of the sphere, or a perspective view of a palace, is a representative in the very same sense as visible figure is, and wherever they have their lodgings in the categories, this will be found to dwell next door to them.\(^1\)

We may pass over the puzzle left open on the ontological status of the visible figure,\(^2\) and go directly to the assertion that there is a necessary connection between the real figure and the visible figure. As Reid puts it:

The visible figure, magnitude, and position, may, by mathematical reasoning, be deduced from the real; and it may be demonstrated, that every eye that sees distinctly and perfectly, must, in the same situation, see it under this form, and no other. Nay, we may venture to affirm, that a man born blind, if he were instructed in mathematics, would be able to determine the visible figure of a body, when its real figure, distance, and position, are given.\(^3\)

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\(^1\)Reid (2000, p. 99).
\(^2\)But see Wolterstorff (2001, pp. 138–139) and page 229 above.
\(^3\)Reid (2000, p. 95).
Unfortunately we are dealing here with two different notions of visible figure. If it is a mere projection onto a sphere, then it is true that mathematics can relate the visible to the real figure, but it is not true that every eye that sees must see it under this form and no other. Reid has here, like so many before and since, neglected the primacy of effort and thus failed to notice that, as Peirce put it, if “we have a picture before us when we see, it is one constructed by the mind at the suggestion of previous sensations”.

The difference between the mathematical projection and what we see is highly instructive, and failing to understand it distorts not only our appreciation of seeing but has potentially damaging consequences—if we tend to think of perceiving as a kind of seeing—for our whole theory of perception. This difference must therefore be investigated so that the errors which advise a general mistrust of the senses can be expunged.

7.1.1 Reading Pictures

The visible figures that we are supposed to be dealing with are the elliptical rim of the cup, the quadrilateral which is the tabletop in perspective, or the complex outline of the teapot standing out against the colour of the tablecloth. These shapes as we see them can only approximately be related to the real figure by mathematical reasoning and sometimes, depending on the context, such reasoning leads to easily noticeable failures.

Believing that the visible figure is not only the same as the mathematical projection, but also a natural sign given originally to those lucky enough to be sighted, misleads Reid into an approval of the myth that representational artists are simply good at noticing what the rest of us could see if we only paid attention. To Reid, the visible figure acts as a sign for the real figure, and we are all given the sign without effort on our part, but then rush past it in order to perceive its significance. Hence for painting and all the fine arts:

The difficulty in them all consists in knowing and attending to those natural signs, whereof every man understands the meaning.

We pass from the sign to the thing signified, with ease, and by natural impulse; but to go backward from the thing signified to the sign, is a work of labour and difficulty. Visible figure, therefore, being intended by nature to be a sign, we pass on immediately to

\[\text{Peirce (1958a, 5.303).}\]
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the thing signified, and cannot easily return to give any attention to the sign.\(^5\)

This is quite wrong and the alleged difficulty is largely invented. To take an analogy, how difficult is it, really, to examine the shapes of the letters in the text we are reading? And how difficult then, at least with simple shapes, to notice that rims of cups change with viewing angle and square tabletops don’t look square unless we stand on them? There are difficulties for realist painters, but these have more to do with assembling a unified scene in harmonious perspective, and translating the observed shapes into free and fluid hand movements, than in abstracting out the visible shapes of individual objects.

Reasons for jettisoning the visible figure in the guise of a natural sign with mathematically precise extension and form have already been given. The exploratory effort is primary in constructing the images that we see, and since sharp borders, directed lines and clear shapes are achievements rather than starting points, they cannot fulfil the role that Reid has assigned them. Ironically, in asking the blind mathematician to comprehend visible figure, Reid contrasts the non-existent jump from the original sign to the real shape with the true order of exploration:

Visible figure leads the man that sees, directly to the conception of the real figure, of which it is a sign. But the blind man’s thoughts move in a contrary direction. For he must first know the real figure, distance, and situation, of the body, and from thence he slowly traces out the visible figure by mathematical reasoning. Nor does his nature lead him to conceive this visible figure as a sign; it is a creature of his own reason and imagination.\(^6\)

But we are, to start with, all blind in this sense; we do not move in a contrary direction. Infants need no mathematical reasoning but they must trace shapes with their arms and by moving their eyes, always relating what they see to the bodily movement. Once we learn to see shapes, it does no harm to call these visible shapes signs of real or tactile shapes, but they are all still creatures of the reason and of imagination.

Helmholtz, like Reid, commented on the craft of realistic painting but he did not make the same mistake. It is striking that when he discussed painterly


\(^6\)Reid (2000, pp. 97–98).
illusions specifically, he hardly mentioned visible figure, and focused his attention entirely on the problems of binocular vision, which make plane linear perspective a less than satisfying illusion, and on the absence of motion parallax, which makes small pictures viewed from close up hardly qualify as good illusions. His comments clearly show that painting is not as simple as noticing something we have merely stopped paying attention to, as in this discussion of binocular rivalry:

Now in ordinary vision we try to recognise the solid form of surrounding objects, and either do not notice this double image at all, or only when it is unusually striking. In order to see it we must look at the field of vision in another way—in the way that an artist does who intends to draw it. He tries to forget the actual shape, size, and distance of the objects that he represents. One would think that this is the more simple and original way of seeing things; and hitherto most physiologists have regarded it as the kind of vision which results most directly from sensation, while they have looked on ordinary solid vision as a secondary way of seeing things, which has to be learned as the result of experience. But every draughtsman knows how much harder it is to appreciate the apparent form in which objects appear in the field of vision, and to measure the angular distance between them, than to recognise what is their actual form and comparative size. In fact, the knowledge of the true relations of surrounding objects of which the artist cannot divest himself, is his greatest difficulty in drawing from nature.

This certainly goes in the right direction but not quite far enough. It is true that the artist has to overcome difficulties to create his illusions, but we too have to overcome difficulties to be taken in by these tricks. We have to learn to read objects into pictures after we have learned to see objects. It is a cultured way of looking.

The reason why artists need skill to convert the image to a flat representation has nothing to do with relearning to see something which we have stopped noticing. It is that they must train themselves to see in a way which is analogous to, but the reverse of, what the rest of us do when we first learn to read

\[ ^7\text{von Helmholtz (1968b). For insightful comments from an artist’s perspective see Hockney (2001).} \]

\[ ^8\text{von Helmholtz (1968c, pp. 118–119).} \]
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pictures.\(^9\) We can get some approximation to this when we decide to overcome the picture illusions which this reading process needs, but this ‘overcoming’ is a far more sophisticated process when it is applied to an image rather than a piece of painted board.\(^10\) To understand this, just consider how hard it is to overcome the window illusion in front of a mirror, and to see it as pigment printed on a piece of flat glass, when we insist on looking with both eyes, or even keep moving about. It demands a superhuman effort to then see a flat looking-glass world.

To free ourselves from the prejudice that reading pictures is somehow natural, we can consider two interesting examples of people who cannot make head or tail of flat pictures, and have to go through a laborious learning process in order to read them. The first example is the young Ernst Mach:

At the age of three Ernst Mach was plagued by perception problems. He had trouble grasping both perspective and shading. He could not understand why tables in pictures had one end wider than the other, when in real life, opposite ends of tables were the same length. [...] He also had difficulty understanding the purpose of pictures. [...] The relation between shadows on sensory objects and shading in pictures completely escaped him.\(^11\)

The second example is a whole tribe in the Amazonian jungle. These people, who call themselves the Pirahã, have extremely well-developed perceptual skills (as befits a tribe of successful hunter-gatherers) and an astonishingly sophisticated tonal language which utilises channels such as whistling and humming in specific, informative exchanges. On the ‘downside’, they do not count with numbers; at all. They also have trouble with something which even now is of little use in the jungle:

The Pirahãs are unable to perceive some things that even children from Western culture perceive well. For one thing, Pirahãs cannot make out two-dimensional objects, as in drawings and photographs, very well. They often hold pictures sideways or upside

\(^9\)This is so hard to do that as soon as they discovered the technology, many famous artists simply cheated and traced over projected images. Hockney (2001) discusses the relevant instruments and strategies in illuminating detail.

\(^10\)As Helmholtz perceptively notices—the point is that a painting does not challenge us with binocular rivalry and that makes the switch quite trivial. See von Helmholtz (1968c, p. 119).

\(^11\)Blackmore (1972, pp. 5–6).
But anyone acculturated into our visual-symbolic way of operating in the world has no such trouble. We insist that our toddlers grasp pencil and paper and immediately start symbolising images even before they have a decent grasp of language; they are also encouraged to look at books and televisions before they have any idea of the ethical, aesthetic and especially perceptual implications of routinely allowing themselves to be duped by printed paper and illuminated screen. So it is not surprising that by the time they grow up the true order of perceptual learning may be lost for them in the mists of forgetting.\textsuperscript{13}

We have already seen that the visible figure given to the passive perceiver is a figment of the imagination. What we see is an image which incorporates what we do, what we remember and what we are expecting. The manufacture of pictures as substitutes for images thrives in our culture as an excellent way of generating various illusions and imparting information. But the two—picture and image—should not be confused, and if the seen image is largely of our own making, then it is important that we ask what priorities we had in constructing it. These priorities are examined next.

\subsection{7.1.2 Prioritising Estimation}

If you suddenly noticed some creature and in your startled surprise started doubting its friendly intentions, but could only know its size or its position or its speed, which would you choose? The question is unanswerable because it is easy to see that just one of those variables is useless. Unless it is considerably distant, which way and how fast it is moving might be the most important

\textsuperscript{12}Everett (2008, p. 249).

\textsuperscript{13}Young infants can make something of flat images. The question of what they perceive is largely a question for empirical psychology. What little we can say about the neonatal brain tells us that infants do not see objects in any ordinary sense of the word ‘see’, and their visual and vestibular systems are not yet closely integrated—something necessary for what adults call seeing. When these connections are disrupted, even partially, then adults insist that they can no longer see. Cf. Maurer and Maurer (1988).

The suggestion that we ‘dupe’ our infants may sound extravagantly unbalanced, but it is not intended as an argument against the usefulness of symbolic representation. However, for an impassioned argument blaming many modern ills on the invention of the alphabet, see Abram (1996).
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fact, but even if it is distant, a large cat hunting will be hard to outrun, so it may be vital to get going without delay. In any case, to our vision these variables are not independent.

Quick estimates of all three variables are called for, but even all this is not enough since the most important information is what it is, how it is oriented and whether it has noticed us. Those are all important if we are to judge its intent and hence our appropriate response. That is a lot of information to get quickly just by looking, and the laws of perspective force us to judge size and position together from context, speed together with the other two variables and context, and the kind of thing it is from a vast storehouse of memories watching similar things from many different angles. Hearing can help a lot and animals tend to use smell very effectively too, but vision has to do much of the work for humans.

Getting all the important visual information quickly and efficiently is a lot to ask for, and this is another reason why seeing is a difficult place to start investigating perceptual processes. We can see much further than we can hear, or sense in any other way, and the wealth of information potentially available not only tempts us, but positively encourages us to dress up the experience of the moment with all the relevant information that we can muster. As Peirce argued, any thinking process takes time and the inferences needed to assemble the visible image take time too. That is the main reason why we do not see simply what is there but what is probably there—what we expect to be there. This role for expectation and anticipation in seeing should be taken quite literally, as the work of Mark Changizi on visual illusions demonstrates.

Changizi explains that it takes time for a proximal stimulus, say a bunch of photons absorbed by some rods and cones, to register as a percept. Hence:

It seems plausible that it would be advantageous for an observer to have, at any time $t$, a percept representative of what is out there at that very time $t$, not a percept of the recent past. If this is so, it implies a modification to the implicit hypothesis underlying most existing probabilistic approaches to perception: the new hypothesis is that, given the proximal stimulus, the scene an observer perceives is the probable scene present at the time of the percept. That is, the hypothesis is that what an observer perceives is not the probable source of the proximal stimulus, but the probable way the probable source will be when the percept actually occurs.\textsuperscript{15}

\textsuperscript{14}See page 228 above.

\textsuperscript{15}Changizi (2001, p. 195), emphasis original.
Changizi then considers the “observer’s typical movements in the world” in order to show “that projected angles are perceived in a way consistent with the way the probable source will project to the eye after a small time period of forward movement by the observer”. The price we have to pay for all the fancy (but fallible) inferences needed to predict the future in this way is small: a few illusions which manifest mainly when we look at cartoons or caricatures designed specifically to catch us out.

Recognising the importance of motion in perceiving, and the influence of the actively predictive algorithms we use to catch the moment, allows us to understand a whole spectrum of illusions in a satisfying way.

But it is a huge leap from understanding how visual perceptual processing works to the suggestion that the appearances are deceptive or false. Neither predicate suits; the appearances are much better, more detailed, more veridical than they would be without any inferential enhancement. In some specific ways they do not match the mathematical projections particularly well, but to expect them to match geometrical truths is, in any case, beside the point. They are estimates involving compromise and prioritisation. No estimate or measurement is perfect, and none can ever match the abstract perfection of mathematical truths exactly. This does not mean that geometrical truths are not relevant to what we see, it means only that complaints that what we see does not match expectations from geometrical considerations miss the mark.

Reid was clear on the relation of geometrical truths to sense experience:

The clear and accurate notions which geometry presents to us [...] are not properly ideas of the senses, nor are they got by compounding ideas of the senses; but, by analysing the ideas or notions we get by the senses into their simplest elements, and again combining these elements into various, accurate, and elegant forms, which the senses never did nor can exhibit.

Had Mr HUME attended duly to this, it ought to have prevented a very bold attempt, which he has prosecuted through fourteen pages of his Treatise of Human Nature, to prove that geometry is founded upon ideas that are not exact, and axioms that are not precisely true.

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18 Reid (2002, p. 419), capitalisation original.
It is as wrong, of course, to claim that the senses fail in comparison with some abstractions—since all that such a comparison can show is that the abstractions are too simple—as it is to claim that we cannot devise exact abstract systems because these are efforts to abstract from the rich complexity of sense experience.

One of the most celebrated illusions of the senses is the so-called moon illusion: near the horizon both the moon and the sun look considerably larger than they do when high in the sky. The illusion can be discovered by covering the full moon by the tip of the thumb, first at moonrise, and then when it is high above. It subtends the same visual angle at all times.\textsuperscript{19} This illusion is an excellent example for us since it was noticed in antiquity, it is not an individual failing or mistake, and many different explanations have been put forward. There is no need to review them; all that is important to note now is that the moon is too far away for us to resolve the visual size–distance ambiguity satisfactorily, and motion parallax is no use since an object that far away keeps up with us on our travels and refuses to change in apparent size. The only thing left to rely on is context, and the most important factor here is our perspective which is achieved by balancing upright and keeping the horizon as a fixed reference. It should not be surprising then that empirical studies suggest that the moon illusion is largely a matter of context, and an easy way to eliminate it (or at least confuse the perceiver’s judgement of it) is as easy as turning around, bending over and viewing the moon through one’s legs! This is yet another delightful demonstration of the close links between our eyes and the vestibular apparatus telling us which way is up, testifying to the complexity of vision and revealing its close links to agency.\textsuperscript{20}

Studying the intricacies of our perceptual strategies and some of their puzzling consequences is one way of getting past inappropriate expectations which suggest that the senses cannot be trusted. If a particular phenomenon does not match expectation, then this can only be recognised and explained on the basis of other phenomena, or the theories which receive their warrant from sense experience. Psychologists and physiologists studying these occurrences have typically seen them as opportunities. As Helmholtz explains:

\textsuperscript{19}For the latest on this illusion, as well as the history, see Ross and Plug (2002).
\textsuperscript{20}Details of the various explanations offered are given in Ross and Plug (2002). Colin Turbayne thinks it possible to train oneself to not see the moon illusion, see Turbayne (1970, pp. 185–191). For myself, I prefer the romantic drama of a large moon rising through scattered cloud and cannot see any benefit at all in trying to overcome this illusion.
The study of what are called illusions of the senses is [...] a very prominent and important part of the physiology of the senses; for just those cases in which external impressions evoke conceptions which are not in accordance with reality are particularly instructive for discovering the laws of those means and processes by which normal perceptions originate.\textsuperscript{21}

Converting an alleged occasional unreliability from a scientific opportunity into a sceptical philosophical thesis takes a large, extra step and this needs to be examined next.

\section*{7.2 Cosmical Conspiracies}

Sight has now repeatedly been characterised as a very special and complex sense. A number of fascinating problems have captivated artists, philosophers and scientists ever since questioning started about how we see.

It is important to recognise that geometry, with all its deductive certainties, is relevant to seeing in a singular manner, and seeing is also peculiar in the variety and range of perceptual insults (failures of expectations raised by the visible image) which onlookers are prone to. Starting with seeing thus offers the temptation to think that a good way to build theory might be to start with a general distinction between appearance and reality, and then explore ways in which the two relate. If these explorations amount to finding the transformations between three-dimensional objects and two-dimensional pictures of them, then this would seem to be an eminently sensible procedure—although the ambiguities arising from the dimensional reduction soon prove it to be an inadequate methodology for explaining how we perform even our simplest visual tasks. More importantly, it does not follow that a general distinction between appearance and reality is either necessary or useful in any other context.

To establish that kind of thesis would require a typology (or taxonomy) of errors and illusions relevant to the various senses, and an investigation of how they arise. Since sense perception relies on organs and nerves and brain, fatigue and other organic, chemical and physical processes are relevant to all senses, but to call the consequences of, say, accommodation and fatigue ‘errors’ is like saying that trees are mistaken in growing upright.

\textsuperscript{21}von Helmholtz (1968b, p. 140).
We have also seen, through numerous examples, how the perceiver acquires perceptual skills in a social context. What individuals are able to discriminate and attend to in a way appropriate to their needs depends on these developments. This can to some extent be considered separately from evolutionary or organic influences on perceptual processes, but here again the language of errors and illusions is misplaced. The skills that social groups cultivate may be compared to the development of language in that some arbitrariness is involved in setting priorities. Now just because perceivers have learned to cope well in some perceptual tasks does not mean that their expectations will always be met. Such failures, however, have nothing to do with deceptive appearances. They are a consequence of the incompleteness of the perceiver’s prior knowledge. Concluding from such failures that the relevant social group has set its priorities badly in developing perceptual skills, however, is like claiming that the set of adjectives currently used in English is ‘wrong’.

Analysis of the usage and implications of ‘appears’ or ‘looks’, when contrasted to ‘is’, may be of some use in the context of vision—as when one wishes to discuss recognition of individual objects, their occlusion, the estimation of their size and location, and so on. This does not mean that there is any ground for elevating such analyses (which necessarily compare some phenomena to other phenomena, and usually set up a rivalry between vision and touch) into a general thesis about perception.

But the customary attitude is not as benign as separating objects from our episodic perceptions of them and investigating the relations. To see this, Audi can again be consulted. In explaining how naive realism is naive and taking the usual route of discussing appearances, he suggests that we

\[
\text{suppose the book I am holding appears, from a certain angle, as if its cover were a parallelogram rather than a (right) rectangle, or feels warm only because my hand is cold. These are perceptual illusions.}^{22}
\]

The use of ‘illusion’ in this epistemological context invites scrutiny. If it is intended as a technical usage free of value judgement, then it is ill-chosen because its position in the language makes it a complaint, as surely as ‘true’ and ‘real’ are approving sanctions in the absence of irony.

\(^{22}\text{Audi (1998, p. 29), emphasis original. The book cannot strictly appear as a parallelogram in the presence of perspective, but this is a detail.}\)
What is illusory about an object feeling warm to a cold hand, or presenting an acute or oblique angle to a particular view? Nothing at all. These are simply orderly perceptual relations. If the naive were always, or often, misled by non-rectangular book covers or elliptical teacup rims and had, say, trouble picking them up, then there may be some appropriateness in ‘illusion’, but since this is not the case another inducement to this usage must be acting.

If the complaint is intended merely as a restatement of the relational aspects of visible shape, feelings of warmth, etc., then talk of illusions is misleading. There is no other ‘true’ appearance in these cases. If it is an evaluation of the relativity of properties in a more general sense, i.e. an assertion that these perceptual properties are not ‘true’ or inherent, then that is either a metaphysical (non-epistemic) judgement about objects which values inherence over relation (for whatever reason), or it is a heuristic move advising some action. In the latter case if any kind of order is sought—as in attempts to discover relations between perceptual experience at one time and another, or to find transformation rules for measurements between different frames of reference—then it is difficult to see why more neutral terms such as ‘relative’ or ‘relational’ will not serve better.

I suggest that the true reason for the language of complaint goes beyond this. There is a hint in the phrase “only because my hand is cold”. There can be an element of surprise when one discovers that expectations have been frustrated, or when beliefs are falsified, and perhaps an apt name for this is perceptual or cognitive insult, in the sense that the word was used on page 248 above. The term ‘insult’ introduces subjective disapproval and a social dimension. It is evaluative rather than factual; what constitutes an insult is conventional, and an individual cannot be insulted unless they accept some circumstance to be insulting as such.

What remains to be asked is whether anything general can be said of perceptual experience in this context. There are clearly good reasons why it is important to speak of illusions, hallucinations, mirages, and other extraordinary perceptual challenges which may amount to specific insults, but this usage in well-defined cases is quite at odds with making blanket pronouncements on all perceptual experience.

Everything that ordinary perceivers face is relative and incomplete, but to convert this into complaints about appearances being illusory, or deceptive, or systematically distinguishable from reality and truth, amounts to the invention of a world hiding behind the veil of perception. Calling the appearance of the
moon near the horizon illusory is a trivial matter of semantic preferences. It does not change the fact that the phenomenon is a consequence of how the human visual system ordinarily operates, and complaints about it are justified only if one proposes to change it for something deemed more desirable. But calling all appearances deceptive or illusory and suggesting that the senses cannot be trusted is something else entirely.

We can now remind ourselves of the reasons why seeing is the wrong place to start when one embarks on theorising perception. Apart from the risk of getting distracted by geometry and becoming captivated by mathematically or conceptually intricate transformations from one appearance into another, there are the errors arising from the customary neglect of what we ourselves do when we are looking, and of the links between seeing and the other traditional modalities.

There is a valuation hidden in the general distinction between ‘appears’ and ‘is’, and a failure to spot it, coupled with the feeling that seeing is passive, easily degenerates into a preoccupation with how ‘looks’, in the sense of ‘appears’, relates to ‘is’, and to suggestions that the appearances are doing something in misleading us. Fortunately, the putative passivity of seeing has already been shown to be the theoretical mistake that it is. What remains to be done is to check that the accusation just made—that arguments over how things look, rather than how we do the looking, flow through the philosophical mainstream—is just. This procedure of ignoring the perceiver’s activity in a general sense is unjustified. To confirm this, we can also show how the kind of argument typically used to motivate a mistrust of the senses falls flat.

### 7.2.1 Looks and Looks

Any review of the philosophical literature on perception can hardly fail to uncover the widespread concern with the analysis of the usage of ‘looks’. What makes this interesting for us is only that it is the sense of ‘looks’ as a synonym of ‘appears’ which monopolises the attention. Both Jackson and Maund discuss various uses of ‘looks’, all of which refer to an object’s appearance, none of which relate to the perceiver’s activity. Leaving aside the active perceiver is fairly typical, with perception often styled as something suffered, something only instrumentally controlled by the sufferer. We can shut our eyes but when they are open we cannot help but see what is there to be seen. Visible objects are doing something to us: they appear.

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23Jackson (1977, ch. 2) and Maund (2003, ch. 7).
CHAPTER 7. DECEPTIVE REALITIES

Discussing how things look, or their appearances, is of course a very ordinary thing to do, and the perceiver’s role is sometimes quite properly taken for granted or ignored. We consider whether a house looks larger from the front or the side, we note that objects which are far off are difficult to make out clearly, especially in a haze.

This ordinary way of dealing with appearances acquires some sharp edges when it is joined to the thought that something might have gone wrong. Here the option of ignoring the perceiver’s part in the process is more problematic. New distinctions have to be made if we are to sort out systematically what has gone wrong, so that it can be concluded with some confidence whether what seemed to be there really is there, whether how it looked in that instance is what should be expected, whether it was perhaps a momentary lapse of judgement or some error not worth bothering with, and what can be done about isolating and understanding the source of the trouble so that it may be prevented or avoided next time.

Dealing with failures and trying to sort truth from error is an ancient concern, and according to D. W. Hamlyn “erroneous judgements in general Aristotle tends to put down to the imagination, although many of the things that he includes under the imagination would be classified differently by us”. 24 Imagination was one of the Aristotelian wits and Hamlyn suggests that “one reason for Aristotle’s catholic treatment of the imagination is that the Greek word for the imagination (phantasia) is etymologically connected with the verb ‘to appear’ (phainesthai) and so covers appearances of all kinds”. 25 While Hamlyn is undoubtedly right that what we mean by ‘imagination’ is quite different to what phantasia once meant, this general direction looks promising when the role of expectations in what we actually see is recognised. Imagining is something that involves the perceiver in judging and doing, and that it is active is consistent with Aristotle’s distinction between sensing (aisthesis), which he thought to be infallible, and imagination, which is not. But thinking this way about the appearances—the phantasma, i.e. what is seen 26—is by no means common nowadays. The usual way of thinking about seeing, and how things appear, is that the observer has little to do with it.

24Hamlyn (1961, p. 27), sentence structure as quoted.
26Edel explains this by saying that a “phantasma is not necessarily a sense image or reproduction but rather the way something appears to a person in all kinds of situations”; Edel (1982, p. 161). That in using the imagination the perceiver acts is also noted by Edel, as well as the place of imagination between sensation and thought.
Observer passivity—styling the appearances as “not the objects of my will”, as Berkeley expressed it—is the main reason why the way we naively approach seeing actually makes understanding the act of perceiving more difficult. Seeing also tempts us into a problematic *general* distinction between appearance and reality, because seeing successfully is a process of trying to eliminate or control perceiver and illumination relativity, so that the *necessarily remote objects* are disconnected from the viewer and are also imbued, at least in some important cases, with a convincing colour constancy.

Paradoxically, perceiver relativity remains in everything we see and our perspective, and the role that context and illumination play in the recognition of individual objects, gives lie to the idea that where we are and how we approach the world does not matter. Armed then with the assumption that physical objects are self-subsistent, and that their actual properties are inherent and independent of our means of perceiving them, we have made attempts to eliminate all their remaining relational properties by creating an intermediate set of objects to carry these properties by proxy. These objects are the appearances or pictures in which shapes are distorted, colours shine and one object can easily be mistaken for another.

Telling this story about seeing is at odds with the other story which accepts relations as fundamental, seeing as an activity utilising a whole suite of skills and habits, and the dynamic participation of the perceiver in the world, with their memories and expectations, as constitutive of what is seen. The story with pictures was a false start even for seeing, and extending it to all perceiving by hiding reality behind fictitious objects through a categorical separation between appearance and reality can hardly be a step forward.

### 7.2.2 The Bent Stick

As already suggested, approaching the problems of perception with a separation of appearance from reality is not only a false start, it also imports valuations based on emotion and personal and cultural preference into epistemology. These valuations of discomfitting surprise, or disappointment of expectations, are difficult to dislodge once entrenched, and a struggle to recover a rationally motivated epistemological method ensues.

Any suggestion that my teapot somehow appears different to how it should, as if it was pretending to be something which it is not, is absurd. This kind of thinking might make a little more sense when my sulky cat starts behaving
like a playful kitten or when a chameleon fades into the scenery, but it is still fundamentally the wrong way to think about perceptual errors and inconsistencies. As suggested above, it is better to style these as insults, offensive only to expectations, desires and beliefs.

In considering vision objectively, the perceiver is found to be always looking actively while the object is normally passive to inspection. The chameleon does not change colour for me—it changes its colour for the location and for the possibility of discovery by a predator. It can hardly be a competent judge of my perceptual skills and it simply does what chameleons do. It is not fooling me, it is not fooling at all. People may be different, but here again if I am taken in by a deceiver, then I am perhaps all too willing to be deceived. I am, in any case, not a fully competent judge of the person that I am dealing with.

Perceptual mistakes can tell us something about the way that we acquire knowledge and understanding; they point to our own activity. To perceive is to judge, and in the context of incomplete knowledge it is all too easy to jump to conclusions and to misjudge. It is not possible to maintain the assumption of passive perception in the face of errors.

Given this, it is important to notice how weak the arguments from error and illusion are. To take just one example, what exactly do we mean by saying that a stick inserted partly in water ‘looks’ bent? There is no disputing the vernacular usage of ‘looks’, of course, but we must be more careful in a philosophical context where ‘is’ is supposed to be hiding behind ‘looks’, and making mistakes about the shapes of distant towers, or the shape of an oar inserted partly into water, is meant to illustrate how this occultation works. These examples are supposed to motivate a general distinction; they are not there to point to some individual’s carelessness.

It must be said that only someone who has not paid enough attention to partially submerged sticks could assert that ‘it looks bent’ without careful qualification. Saying it looks bent surely cannot mean that it looks like a bent stick, because it does not. In fact it looks exactly like what it is. We see both the water and the stick. Someone who notices this for the first time may be puzzled by the phenomenon and try to explain it, but I struggle to understand how they could possibly mistake the object for a bent stick. What is actually seen changes in interesting ways depending on the viewing angle and the perceiver’s motions, so what is really puzzling is not the visible shape of the stick but the fact that its shape depends in some remarkable way on how we move our head. If it is hard enough to believe that the stick is really
bent, it is almost impossible to believe that we can change its shape without even touching it!

The kind of seeing relevant to the present arguments has been characterised by Gibson when he discussed pictures and illusions:

The eye is easily deceived, and our faith in the reality of what we see is therefore precarious. For two millennia we have been told so.

The purveyors of this doctrine disregard certain facts. The deception is possible only for a single eye at a fixed point of observation with a constricted field of view, for what I called *aperture vision*. This is not genuine vision [...] Only the eye considered as a fixed camera can be deceived. The actual binocular visual system cannot. [...] I do not believe the stories about birds and painters being fooled, any more than I believe that Pygmalion really fell in love with his statue. The illusion of reality is a myth.27

It is possible to be mistaken, especially if we rely on a careless or inattentive glance. It is also possible not to notice something novel. But we are rarely deceived, and all that follows from noting that there is always more to be noticed is that observing more closely will reveal more to see. This has nothing to do with any claim that what we ordinarily see is not or may not be veridical. That kind of claim, made on the strength of occasional lapses, is like insisting on the basis of an occasional forgetting that it is impossible to tell whether it is ever possible to remember something.

Sceptical arguments involving towers, sticks and mirrors, based on anecdotes and puzzling incidents, are ineffective if they aim to prove anything more than what everyone already knows: that we sometimes err. Instead of blaming objects and situations for our mistakes and using these to suggest by some extravagant induction that all knowledge is tainted, or that esoteric methods are required to learn the truth, or even that a true apprehension of reality may be beyond us, it would be more constructive to ask how it is that we come to make mistakes. Some of these, like the moon illusion and a host of other visual illusions, are not individual errors, and should perhaps not be called errors at all. But investigating any of them must surely start by asking how the perceivers went wrong in what they are doing. That means starting not

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27Gibson (1986, p. 281), emphasis original. By the same token, the reality of *universal* illusion is a myth.
with ‘looks like’, but with ‘looks at’, ‘examines’, ‘scrutinises’, then ‘compares’, and so on and so forth. Even ‘looks at’ already gives a vital clue that we must have perspective and orientation. Looking and seeing go together, but neither comes without the perceiver’s ability to take a stance.

The idea that alleged deficiencies of one or another sense should advise a general distrust of the senses is inherently odd, since such deficiencies can only be identified with the help of superior knowledge. But if all our knowledge of the physical world is rooted in sense perception, it is hard to see where one should search for something superior.

Reid devised an elaborate scheme to accommodate a picturing theory of perception and to bolster it with a direct apprehension of the primary qualities of the science of his day. We now recognise that these primary qualities, as we come to know them, are as relational as all our other sensory knowledge, and a great deal of progress has been made to elucidate how we get that knowledge and which organs we use to get it.

But Reid’s main lesson retains its value. There is a world of difference between the claim that our senses—or, more precisely, the ways we use them—are fallible, and the claim that they are deceptive or fallacious, that they are insufficient for a knowledge of the true and the real. As Keith Lehrer sums it up:

The claims of common sense are often challenged in our day as they were in Reid’s day. His defence of common sense is as relevant to contemporary concerns as it was to his reply to Hume. We have no proof that our faculties cannot be deceived. The nature of the thing does not admit of proof against a sceptic, for to prove anything we must use the premises of those very faculties the sceptic calls in question.

Moreover, our faculties, if not fallacious, are not infallible either. This Reid recognized, though he was inclined to give more credence to the original beliefs of our faculties than many would today, when he remarked that such beliefs were justified until shown to be in error. What remains unshaken in the philosophy of common sense is the assumption of the first principle that our faculties are not fallacious. For we must use our faculties to detect error, and we have as great a need to depend on our faculties in science and everyday life to detect errors in our beliefs as to arrive at them in
the first place. We may have detected more errors in our original beliefs than Reid would have expected, but the idea that science and philosophy can stand on their own without the support of the first principles of the human mind, the principles of common sense, leads inevitably to scepticism. That was Reid’s lesson.\footnote{Lehrer (1998, p. 25).}

7.3 Summary

Recognition of the dynamical processes within the perceiver’s activity in looking to see demolishes the traditional assumption that seeing can be understood as a process of examining pictures given to the waiting perceiver. The notion that there is something given to vision which includes spatial information such as shapes, locations and directions, played a prominent role in Reid’s account of seeing. He even felt it necessary to make extension a primary quality for vision and approved of Berkeley’s distinction between tactile and visible distance.

However, the idea that reading depth into flat pictures is a skill, which everyone who can see has mastered, can be challenged by considering counterexamples. Interpreting pictures as representations of a three-dimensional reality is actually an achievement specific to certain cultures, and humans can see perfectly well without being able to make head or tail of pictures. Furthermore, as Helmholtz explained, the difficulties of the representational artist have little to do with the need to go back to some supposedly more original way of seeing.

Real seeing is more complex, and the perceiver uses more senses to aid the eyes, and is more active, than has hitherto been suspected. Seeing is the modality which we use to reach the furthest, and with which we attempt to estimate numerous quantities at once, but without direct contact, or as much serial exploration as occurs in touching. Too much is at stake in seeing and the difficulties are formidable since the panoramic sweep available to vision is vast, the world is animated, and the biological necessity of looking from a particular viewpoint introduces limitations and ambiguities. There is insufficient time to register every detail, and much of what we see is coloured by our expectations. These expectations are incorporated explicitly into the shapes we see and, as Mark Changizi has shown, recognising them enables us to classify the visual
illusions in a satisfying way. What we see must therefore be considered as incorporating compromise and estimation, i.e. heuristics. Comparing the results to geometrical projections of static arrangements of objects is thus only a part of the story.

Failing to recognise the activity of perceivers in seeing, and then generalising an inadequate theory of vision to perceiving, leads to the notion that our senses may be fallacious—giving us a false or misleading picture of reality. It is true that vision is prone to a variety of so-called illusions, but once we recognise that these phenomena are seen as illusions only in the context of theoretical demands, we are free to investigate them without prejudice as the consequences of the choices made by active perceivers. As we have already seen, these choices are not individual, but neither are they fixed by necessity.

The theoretical and philosophical demands which counsel that vision is somehow defective are complex, but the demand for a knowledge of objects which is not relational to perceivers is prominent among them. The preoccupation with how things appear as opposed to how they are, is evidence that the (naive) perceiver is taken to be not only deceived, but may have considerable difficulties in fixing the alleged problem. On a philosophical level, this problem is set up as the need to overcome observer relativity in order to understand what is real and independent of observers—naive observers are supposed not to notice these relativities.

Putting the epistemological issue in this way caricatures the ‘inspecting pictures’ account of seeing, since the real world is supposed to be hidden behind the appearances and needs to be approached through them—just as seeing distant objects was thought to be reading pictures. Even if this scheme had worked for seeing, it could never be extended to all perceiving. According to this scheme, the notion of the world of volumes and solids is not got by sight, but by a dynamical, bodily participation in the physical world. It is thus ‘given’ along with the visible pictures so that their ‘meaning’ can be ascertained. No such alternate route to reality, given separately from perception, would seem to be available. Even the abstractions we employ in building theory are obtained from sense experience, and any knowledge of them relies on our senses. That knowledge is thus entirely relational; if not to one sense, then of necessity to another.

There is no good reason to think this way if we are content with perceiving as a relational transaction. The so-called errors of the senses can then be re-examined on a case by case basis, and the arguments intended to motivate a categorical distinction between appearance and reality safely laid aside.
7.3. SUMMARY

Reid may have assumed too much as given originally to vision and touch, so that the signs we were given by nature turned out to be astonishingly complex hieroglyphs, instead of simple letters. He may also have tried too hard to make room for the literal truth of the scientific theories of his day by dividing primary from secondary qualities and not paying sufficient attention to how we perceive the so-called primaries. But it would be unfair to accuse him of failing to notice something obvious, since even now much remains to be discovered concerning our perception of the dynamical variables and the spatio-temporal order. It is also testimony to his genius that he was among the first to note the key role of balance.

Faulting Reid on the details of theory is hardly fair, since in many of these matters he was simply a man of his time. But he was also exceptional in that he knew well enough that trust in the senses is not a matter of choice, but the foundation for all understanding and striving for knowledge. It is as vital for science and philosophy as for ordinary life. So, to try to exploit some of what we notice about the normal functioning of our senses in an extravagant argument for scepticism is wrong procedure. It is more promising to start with this:

We have seen, in vision particularly, that the same appearance to the eye, may, in different circumstances, indicate different things. Therefore, when the circumstances are unknown upon which the interpretation of the signs depends, their meaning must be ambiguous; and when the circumstances are mistaken, the meaning of the signs must also be mistaken.

This is the case in all the phenomena which we call fallacies of the senses; and particularly, in those which are called fallacies in vision. The appearance of things to the eye, always corresponds to the fixed laws of Nature; therefore, if we speak properly, there is no fallacy in the senses.\(^{29}\)

We have seen that very little, if indeed anything but colour, is given originally in seeing. It is our most audacious modality, reaching out to the horizon and to the stars. Scientists have now struggled for millennia in trying to understand just what it is that we do to see, and recent discoveries are still challenging accepted notions. In view of this, any theory of perception built out of naive ideas about seeing will be precarious indeed.

\(^{29}\)Reid (2000, p. 189), emphasis original.
Chapter 8

Conclusion

I have examined and challenged three assumptions about the human senses. It is commonly believed, and often unquestioned in philosophical accounts of perception, that we have five senses and that these function quite independently. Seeing is also considered to be not only an important sense, but for the purpose of theorising perception a typical one.

These assumptions have been shown to be questionable, and progress in scientific understanding of sense perception renders them problematic. It is best not to adopt them in critical inquiries into perception.

The philosophical interest in questioning the three assumptions arises in noticing that while the count of five senses is almost universally accepted as common knowledge, scholarly traditions and scientific disciplines depart from it. It is not just growth in knowledge which informs these developments, but also fundamental change in the concept of a sense.

Four general criteria are used in modern efforts to classify and count the senses. These are based on differences in sensations, functionality of organs, physical nature of the stimulus, and the behaviour consistent with the use of a particular cognitive faculty.

All these criteria seem essential or at least important, and yet they conflict. Taken separately or in various combinations, they are either of little help in counting senses, or advise indefinite counts which do not reflect our ordinary waking experience. The fact that there is no agreed count in the scientific community is a symptom of this incoherence in our understanding of what a sense is.

I have shown that philosophical attempts to solve the counting problem tend to deprecate reliance on sensations in favour of some combination of the
other three criteria. This procedure brings in complications which are best understood by considering attempts to replace a direct appeal to sensations, styled as private and subjective, by theoretical accounts of the stimulus.

Since theoretical descriptions must be validated by direct sense experience, the procedure is unworkable when it is applied generally to the full spectrum of subjective experience. In the modern context of a theoretical landscape which offers only partial, impermanent, and often conflicting accounts of the phenomena, this methodological weakness is not readily apparent. It is most easily revealed by adopting a historical approach, and the views of Thomas Reid have been examined in some detail in order to demonstrate some of the dangers. Progress in science between Reid’s day and the present illustrates how dramatically empirical results can affect philosophical opinion.

Diagnosing problems in the criteria used in counting senses shows the importance of understanding how the senses are individuated. I argue that the naive tradition of five is wise in relying primarily on sensations to individuate senses. If there is a problem with the naive view, it is unlikely to be its reliance on sensations but the fact that the count seems incomplete. Many sensations additional to colours, sounds, etc. can be distinguished. There seems to be no reason not to count additional senses for at least warmth and perhaps pain. The count of five can be explained, however, when a conservative separation of the external world from the bodily and emotional experience of the individual perceiver is taken into account.

I have proposed that one of Thomas Reid’s most remarkable contributions to our knowledge of the senses is his suggestion that bodily balance be counted as an additional human sense. This turns out to be a radical suggestion. The way that Reid characterised this sense indicates that balancing and maintaining posture places the perceiver centre stage as an active participant in dynamical relations.

Considering bodily balance in detail spoils the naive picture of five separate senses because it proves that the conservative separation used in it is arbitrary. This separation neglects the links between the perceived world and the perceiver’s embodied exploration of this world, as well as the complexity of the traditional five.

Orientation and perspective, both arising from dynamical balance, have formerly been taken for granted in the operation and use of the five senses. A fresh look at how the five are used by the active perceiver reveals that balancing is constitutive of all human sense experience, including anything perceived by
using the five senses. Considering balance can thus revolutionise our concept of what a sense is.

Recognition of how important the separation of the perceiver from the world is in counting senses, and how the naive view oversimplifies the matter, suggests that the ideas underlying this separation need to be reconsidered. Discussing perceiving and investigating the associated orderly processes presupposes no absolute division between the individual perceiver and the world. The individual must be treated as a social and biological being on a par with others of the same kind to make any discussion of perceiving meaningful.

What follows from this is that we may need to rethink what calling sensations private and subjective can mean. The denial that sensations have a role in the individuation or the counting of the senses may be seen as an attempt to treat the perceiver’s experience as absolutely private, while assuming that the perceiver is an exemplar of a species. These two aspects would seem to be irreconcilable.

None of these considerations—how many senses there are, how they are individuated, and how the perceiver enters into dynamic relations with perceived objects—have been prominent in philosophical accounts of perception. These accounts have largely been modelled on seeing. Unfortunately, seeing has not been approached critically, and the perceiver is usually characterised as a spectator. This spectator is given pictures to interpret, and making mistakes is a consequence of being misled by the appearances.

Even if this type of account is of some use in understanding seeing, generalising it to all perceiving by categorically distinguishing appearance from reality and exploring how they relate creates difficulties. If the usual notions about the subjectivity and privacy of personal experience are retained, then it seems that veridical perception of reality cannot be taken for granted, and we may even be tempted into thinking that it cannot occur.

However, an examination of seeing reveals that it is, like all the other sensory modalities, a cultured skill involving a range of accomplishments. Recognising the central importance of balance in seeing dismisses the passive spectator and reveals a different character: an active participant whose perceptual skills are grounded in biological endowments but facilitated by the social environment. A preoccupation with appearances and illusions, and how they mislead the largely passive perceiver, can then be understood as an attempt to apply problematic assumptions about seeing to all perceiving.

If explicating the concept of a sense and finding robust criteria for counting
is found to be difficult, it is worth asking why we need a definitive count. Ordinary language does not prevent us from describing or sharing our experiences and feelings. A specific vocabulary listing individual senses is not required to talk about pains, itches or burns. Nor does the lack of an accepted taxonomy seem to be hindering progress in those sciences concerned with cognition, since each specialist area readily develops its own technical terminology without the need for universal agreement on the number of senses.

The counting problem is thus not an impasse to be overcome if we wish to improve or develop our perceptual skills. Investigating it is instructive mainly in what it tells us about our concept of a sense. The important question is not how we should count the senses. Now that perception is revealed as a skilled activity of the perceiver, the key question may perhaps become: how should we develop our senses?
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